

AMERICAN JOURNAL OF OPHTHALMOLOGY

CONTENTS

Original Papers	Page
The scotoma of glaucoma simplex. Ralph I. Lloyd	579
Gonorrheal ophthalmia. James I. Farrell	591
A correlation between pupillary area and retinal sensibility. M. Luckiesh and Frank K. Moss	598
Delimiting keratotomy. Harry Gradle and Sanford R. Gifford	602
The electrocautery in the treatment of corneal ulcers. A. W. Morse	608
The testing of visual acuity. C. E. Ferree and G. Rand	610
The lipids of retina, brain, and blood. P. J. Leinfelder and P. W. Salit	619
An ophthalmological survey of Illinois State School for the Blind. A. L. Adams, R. C. Gamble, S. R. Gifford, and H. S. Gradle	624
Experimental production of detachment of the retina. Herman Weiss and John N. Evans	627
Parinaud's conjunctivitis. Clyde E. Harner	629
Notes, Cases, Instruments	
Improved illiterate test chart cabinet. Jacob B. Feldman	632
A special presbyopic glass. William Brown Doherty	632
Supporting suture in ptosis operations. Albert D. Frost.	633
Society Proceedings	
New England, Chicago and Illinois, Colorado, Royal	634
Editorials	
Color filters in the retina; The problem of rebating; Classification and treatment of strabismus	644
Book Notices	647
Obituary	649
Abstract Department	650
News Items	682

For complete table of contents see advertising page V

Copyright, 1934, Ophthalmic Publishing Company, 640 South Kingshighway, Saint Louis, Missouri

Subscription price in United States ten dollars yearly. In Canada and foreign countries twelve dollars.

Published monthly by the George Banta Publishing Company, 450 Ahnaip Street, Menasha, Wisconsin, for the Ophthalmic Publishing Company, 640 S. Kingshighway, Saint Louis, Missouri

Editorial Office: 640 S. Kingshighway, Saint Louis, Missouri

Entered as second class matter at the post office at Menasha, Wisconsin

**"I
understand
your problems
Doctor"**



"We'll be glad to give the matter some study and let you know our suggestions in the next day or so." Typical of any number of consultations (mail or phone) between customers and our Technical Department is the above which, to us, strikingly portrays the willing co-operation that department (or any other) is always willing and ready to give. . . . In this particular instance, an office was being remodeled; advice on the proper and efficient positioning of instruments was

needed and received. But not only is this department qualified to answer problems of that nature. Questions on instrumentation, lenses or any general optical problem will find a receptive ear here. . . . If ever you have need, the Riggs Technical Staff is at your disposal. Of course, we're not infallible and sometimes neither can we find the answer, but we're always willing to try. Your Riggs Representative or any of our offices will gladly give you all the details of this service.

Riggs Optical Company

AMERICAN JOURNAL OF OPHTHALMOLOGY

VOLUME 17

JULY, 1934

NUMBER 7

THE SCOTOMA OF GLAUCOMA SIMPLEX

RALPH I. LLOYD, M.D., F.A.C.S.
BROOKLYN

This article gives a consecutive description of the typical scotoma of glaucoma from its beginning through the various stages of its development until central vision is lost. At the same time, it shows the limitations of the perimeter and emphasizes the importance of using test objects with small visual angle against a flat surface, if these defects are to be found at a time when treatment is effective.

Much of the literature of this subject comes from pretonometer days and was written from the standpoint of differential diagnosis, while today we know that field studies are the only reliable indicators of gain or loss.

There are many who believe that the peculiar field defect so regularly found in glaucoma simplex is a recent discovery, but the study of glaucoma and its problems antedates the ophthalmoscope, which came into use in 1851. Prior to that time, the ophthalmologist had no idea of the fundus picture and was compelled to substitute for the tonometer and ophthalmoscope an examination of the visual fields against a flat surface. With this very simple apparatus, the differential diagnosis of such conditions as glaucoma, atrophy of the optic nerve, detachment of the retina, and pigmentary degeneration was made. The proficiency of the ophthalmologist of that day in examining the central part of the visual fields was amazing, and a few examples of their work are included in this article, not because the evidence is necessary to support this statement but because they will clearly show the typical glaucoma defect from its earliest days through the various stages up to loss of central vision. Foerster introduced the perimeter in 1870 and all of the proficiency in campimetry and its lessons were swept away and apparently entirely forgotten because the perimeter seemed such a wonderful apparatus that any defect present could not escape it. We should remember in this connection, however, that much time, energy, and enthusiasm were required in writing the new ophthalmology revealed by the ophthalmoscope. From this time until Bjer-

rum demonstrated (1889) the advantage of small-angled, white-surfaced test objects in series, against a flat surface, to replace the field examination on the perimeter with what turned out to be very large-angled test objects in a series of white, red, green, blue, and yellow, the existence of defects in and about the macular area extending from the blind spots, although well known to Graefe, Haffmans, Donders, and others, was denied or ignored. In 1856 Graefe published his classic article on "Examination of the visual fields in amblyopic affections." From the part referring to glaucoma, the following is taken: "The anomaly in question attains its greatest diagnostic dignity in chronic glaucoma and the closely allied forms of amaurosis found in old people with rigid arteries. At a time when the visual-field acuity is almost normal and excepting a suspicious optic disc, no other signs are present; the clouded peripheral vision in certain directions proves the existence of disease for some time previously. Also, the line limiting the affected area, although obeying no set rule, usually runs diagonally through the visual field in such a way that the upper-outer or the inner-lower part of the same receives impressions imperfectly" (fig. 1). This peculiarity of the visual field in glaucoma was the basis of the ancient edict that the visual field of optic atrophy was a concentric contraction in contrast to the eccentric contraction of the field in glaucoma.

Groenow amplified this distinction by his penetrating observation that the loss of vision in glaucoma was a lowered point perception while the atrophy case lost color perception first. If this is translated, we can understand the statement that in glaucoma the color-field loss followed closely the outline of the field for white, while the atrophic

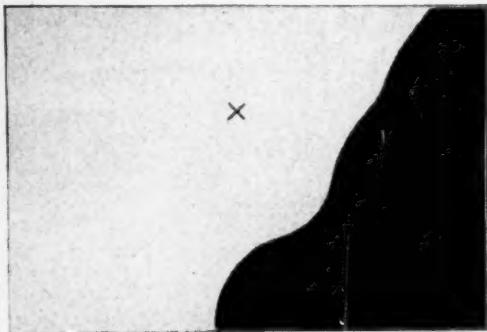


Fig. 1 (v. Graefe, 1856). The diagonal line divides the seeing from the nonseeing retina in glaucoma.

field was very small for colors and of good size for white. In 1861, Haffmans, who worked with Donders in Utrecht, made this observation: "All forms of glaucoma have contracted fields, but in glaucoma simplex it is not an early sign. Often to hardness of the bulb, decided cupping of the disc and vessel displacement are added before one can prove shrinking of the fields. . . . Not unusually, one can prove that in some part of the field, at least, there is reduced vision. If the illumination is reduced, the shrinking is more pronounced. With a few exceptions, we always find the diagonal contraction of the field characteristic of glaucoma. When the contraction has advanced far, we find the ends of the diagonal border line drawing closer to each other. In those cases in which the contraction seemed concentric by daylight, the diagonal form could be demonstrated by candlelight, with but few exceptions. . . . The important result attained is that the contraction of the field always begins on the same side and extends from this place. The outer part of the visual field retains its function longest and the outer part of the retina is destroyed

first. Sometimes the shrinking begins above, sometimes (less often) below; but without exception, this is the inner side. This can be taken as a hard and fast rule. One concludes from this that the bundles of the optic nerve spreading outward from the papilla, become atrophied first; and among these, the superficial ones going out to the periphery are the first to suffer. The deeper fibers and especially those which end near the yellow spot resist longest."

No better description of what is now known as Rönne's nasal step could be desired. In 1869, Landesberg reported the case of a 47-year-old officer who received a glancing blow from a bullet on the left side of the head and face. A superficial furrow indicated the course of the bullet, and later in the day he was more severely wounded in the leg. The eye on the side of the wound became hard and painful and later the second eye developed hyper-

Rechtes Gesichtsfeld vom 5. October.

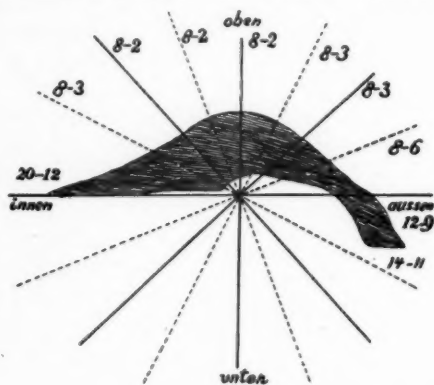


Fig. 2 (Landesberg, 1869). "Comet defect" found by Landesberg. The figures indicate the nearest point of the defect to the fixing point along the various meridians and also the farthest measurements in centimeters.

tension but was rescued by an iridectomy. The first eye had been operated on at the same time as the second eye, but its sight was lost and the eye was painful and red for a long time thereafter (fig. 2). Landesberg mapped a perfect "comet defect," as the illustration will show, but failed to associate it with the blind spot or understand its

significance. A score of years passed before this defect was recognized as the characteristic defect of established glaucoma, receiving the name of the discoverer, the Bjerrum sign. In the same year, v. Graefe published his classic on glaucoma. From it, we learn how thoroughly he had studied the question of glaucoma in every detail. "The effects upon the function are known, if the macular area is not involved, particularly by the fact that the central visual acuity in proportion to the damage done the visual field, remains intact for a long time. This must be attributed to the greater resistance of the fibers going to the fovea and vicinity. In particularly striking manner, this is shown in well-advanced cases of glaucoma, wherein one sees a visual field shrinking more and more from the inner side, gradually approaching the fixing point which is then encircled by two spurs, one from above and the other (fig. 3) from below, which finally flow together outside of the fixing point, so that now (as is indicated in his Figur II), the field is composed of two separate parts: a small central and a small temporal portion, wherein function is retained. This is not often observed because the temporal portion often disappears quickly, leaving but the central oval. This latter stage, which may last a long time, comes to our attention more frequently. In other cases, wherein, supposedly, the macular fibers are less resistant, when the field has narrowed internally almost to the fixing area, after an almost never failing pause, the central area is overcome and only the temporal remains." Here is the biography of the visual-field defect characteristic of glaucoma simplex described more than sixty years ago and lacking but little to pass as the product of the best mind of this day. The clinicians of that day disregarded the importance of these contributions and the perimeter was accepted as the only necessary instrument for visual-field studies, and all central defects were passed over in a mistaken effort to attain the highest standard of efficiency.

Not until 1889 did the profession turn back to the indispensable campim-

eter to study the field defects of glaucoma and then very reluctantly. Bjerrum published his most important contribution in the Scandinavian Ophthalmic Magazine and emphasized that the real value of the perimeter was to outline the visual field and to give the

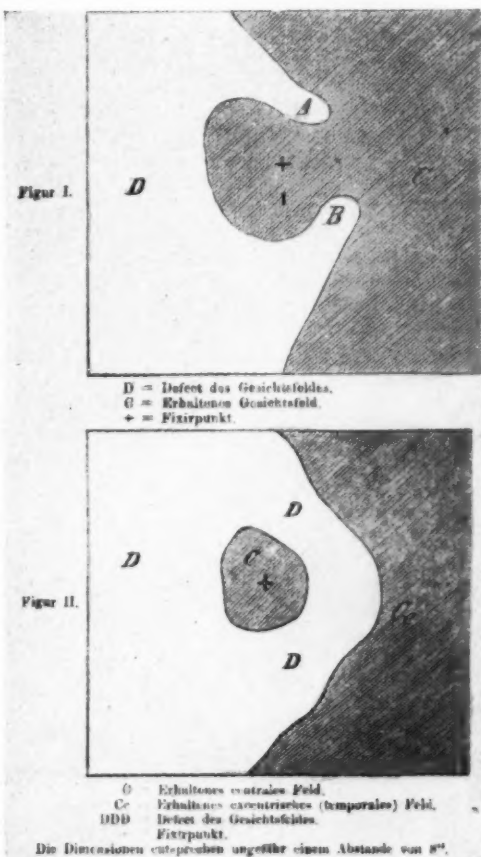


Fig. 3 (v. Graefe, 1869). Illustrations accompanying v. Graefe's article on "Glaucoma." The fingerlike spurs that inclose the fixing area by flowing together outside the macular area are indicated by A and B in the first figure. The functioning areas are dark and the fixing point is indicated by the cross.

examiner an idea of the type of case he has before him. The use of serial colored test objects had disgusted the profession with the usual quantitative measurement of the field on the perimeter and Bjerrum showed conclusively that the 5-mm. white test object at the usual perimeter distance of 150 mm.

was much too large for a standard normal. Using his formula of size of test object (5 mm.) over the distance of the test object from the eye (150 mm.) multiplied by 180° divided by pi (for which 3 will be used), it is easily shown that the visual angle subtended by this

series, Bjerrum suggested the employment of white test objects only, in series, and reduced quantitative perimetry to a practical proposition. With this method against a black screen at one or two meters' distance, he showed the "comet defect" as the characteristic

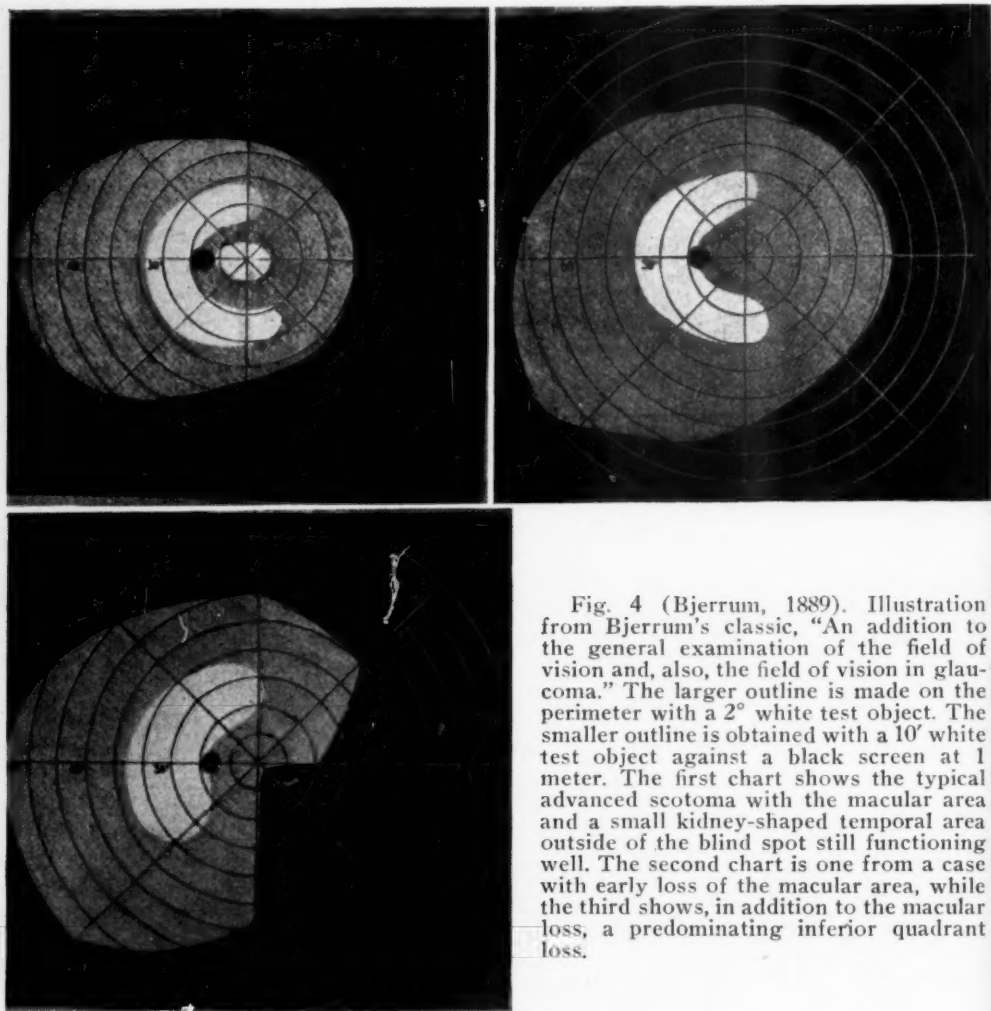


Fig. 4 (Bjerrum, 1889). Illustration from Bjerrum's classic, "An addition to the general examination of the field of vision and, also, the field of vision in glaucoma." The larger outline is made on the perimeter with a 2° white test object. The smaller outline is obtained with a $10'$ white test object against a black screen at 1 meter. The first chart shows the typical advanced scotoma with the macular area and a small kidney-shaped temporal area outside of the blind spot still functioning well. The second chart is one from a case with early loss of the macular area, while the third shows, in addition to the macular loss, a predominating inferior quadrant loss.

test object at this distance is 2° and much too large for practical use.

$$5 \text{ mm.}/150 \text{ mm.} \times 180^\circ/3 = 2^\circ$$

One might as well say a patient had normal vision if he could read the 20/40 line of test type.

To overcome the serious objections to the use of colored test objects in

result of increased intraocular pressure. Some of his charts are presented and require only the added explanation that the larger outline is the field outline obtained on the perimeter with a 2° white test object. The smaller area is the field outlined by a small white test object against a flat surface and tells quite a different story. This article awakened

the profession to the fact that they had for (fig. 4) years overlooked a very easily outlined defect with very definite characteristics. True to form, came the rush from the perimeter as the perfect apparatus to the flat surface with test objects of very small sizes.

We are indebted to Bjerrum for showing how the field defects of glaucoma could be found, the characteristic shape, and the sphere in which the perimeter was useful. It is interesting to note that Friedenwald published what seems to have been the first glaucoma defect shown in this country in 1902. In 1909, Rönne, who, with Meisling, had worked with Bjerrum in developing the technic he commended, published his article pointing out the manner in which the "comet defect" ex-

spot and the indent passing inward along the horizontal meridian from the periphery, occurred. This usually developed above the horizontal meridian first and by the time the two elements of the defect had joined, the whole upper nasal periphery from axis 180° up

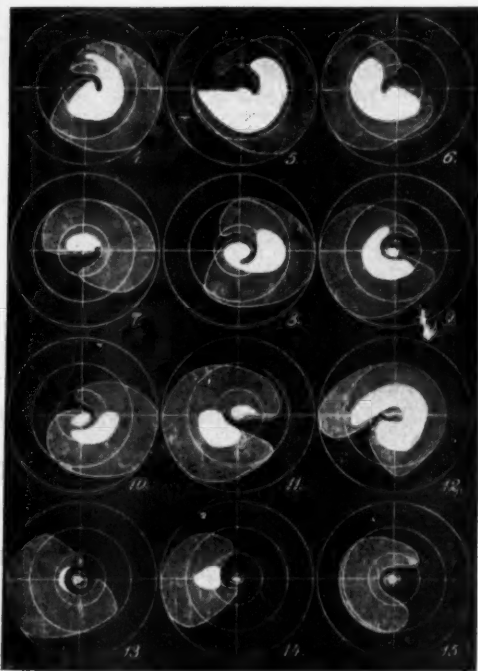


Fig. 5 (Rönne, 1909). Illustration from Rönne's article showing the "Nasal step."

tended from the blind spot to spread out along the horizontal meridian from the macular oval to the nasal limit. As the defect spread toward the nasal periphery, the nasal limit of the field began to shrink and finally a junction of the defect spreading from the blind

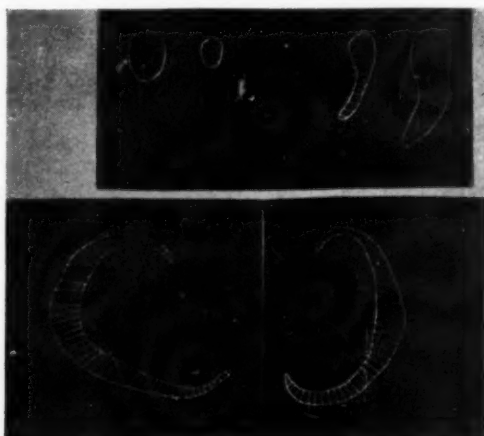


Fig. 6 (Seidel, 1914). Illustrations from Seidel's article describing "Sickle scotoma." They are outlined according to the Bjerrum method. The two outlines for the right and left eye, respectively, in the upper figure, were mapped at 1 meter and also, at 2 meters. Below are two well-developed sickle defects.

to and even beyond axis 90° had faded, making a triangular defect except for the small central macular oval, but always on the nasal side of the vertical meridian. This is now known as Rönne's nasal step and is the very late stage of the Bjerrum sign or comet defect. This nasal step is the first sign detectable with the perimeter and once established, never entirely (fig. 5) disappears.

About five years after this publication, Seidel published his discovery of the very earliest demonstrable blind-spot enlargements. Using methods similar to those introduced by Bjerrum, he showed the constant and intimate association of the enlarged blind spot and increased intraocular pressure. This enlargement was called by him the sickle scotoma, but now it is more commonly known as the Seidel sign. It had not been found before because it exists

only in the early stages of glaucoma or during a sudden increase of pressure, to pass soon into a true comet defect, which, in turn, goes on to the nasal step of Rönne. It extends upward and downward from the blind spot, and, in the minds of the profession is an indication of the effect of pressure within the eye upon the blood vessels of the retina. This defect is so early in its appearance that it can easily be eliminated by miotics if they are effective or by any other means that will reduce pressure. Some of the sickle scotomas appearing in Seidel's original article are shown (fig. 6). The following is his chart to show the close association of this defect and pressure within the eye.

Date		Tonometer	Blind-spot findings
Feb.	14	30 mm.	Sickle scotoma
	17	Elliot trephining	
	24	7 mm.	
March	8	19 mm.	Sickle scotoma
			Normal blind spot
	17	20 mm.	Moderately enlarged
April	8	47 mm.	Ring scotoma
	10	41 mm.	
	11	Elliot trephining	
	15	15 mm.	
May	8	14 mm.	Ring scotoma
	27	18 mm.	
June	6	15 mm.	Sickle scotoma
July	1	14 mm.	Small sickle scotoma
Aug.	30	19 mm.	
Nov.	30	19 mm.	Very small pro-longation downward from blind spot

In reverse order of their appearance, the stages of the characteristic defect of glaucoma simplex have been described in terms used by the discoverer of each stage. The illustration accompanying this part of the article shows the usual course of a case of glaucoma from the early stage up to the time when the patient complains of not being able to see round about him but is able to read fine print; then, after the long pause so well described by Graefe, vision may suddenly disappear. The first chart shows the early Bjerrum sign, which, however, is not to be rec-

ognized on the perimeter. There may be a suspicious indent above or below, or both above and below the end of the horizontal meridian but only a flat surface with appropriately sized test objects will reveal the sickle of Seidel or the comet of Bjerrum. The second chart shows the nasal indent linked up with the Bjerrum sign, which, in the third chart, has developed into a typical Rönne nasal step (fig. 7).

Almost always the upper nasal quadrant suffers before an encroachment upon the lower nasal quadrant is evident, and for this peculiar habit no satisfactory explanation has been offered. Proksch examined 100 cases of glaucoma simplex to ascertain how many followed this plan and how many deviated therefrom. The major loss was in the upper nasal quadrant in 62, in the lower nasal quadrant in 20, and in 18 the progress above the horizontal meridian was equaled by that below (fig. 8). When the defect has reached the stage shown in the third chart (fig. 7), it is easy to show a Bjerrum sign in the lower half of the field and, in a period of months, the state of affairs shown in the fourth chart (fig. 7) is reached.

The macular area usually retains its function for a relatively long time; in fact, a surprisingly long time, but there are notable exceptions as we can all testify. The temporal peripheral area, now shaped like a kidney with the blind spot at the hilus, shrinks until only a small zone external to the blind spot remains. The patient is now in the stage when, overnight, central vision may be lost but, as a rule, only after a rather long period, if we consider the pathology of the case, the paleness of the disc, and the condition of the blood vessels of the retina. There now remains only a small temporal area that has any function whatever. The period of time from the first definite signs to this last stage is about five or six years, with many exceptions to the rule. Perhaps the most important departure from the rule that the macular area carries on long after it seems impossible for a nerve head as white as the glaucomatous disc often becomes

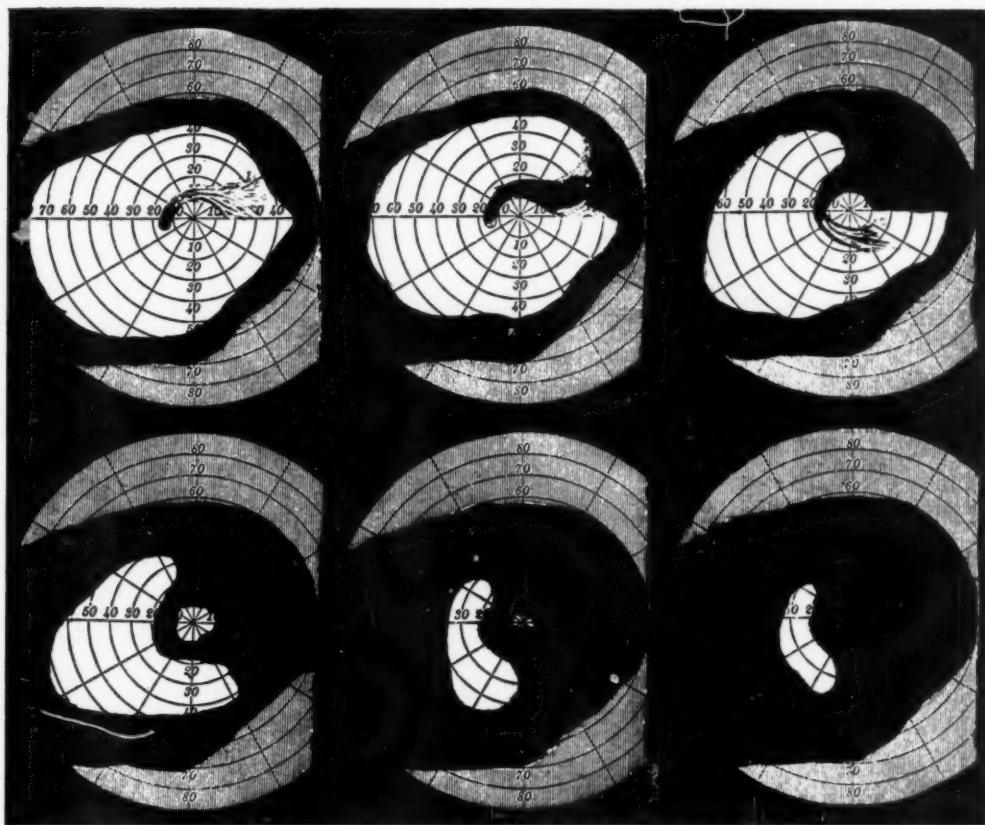


Fig. 7 (Lloyd). Autobiography of the glaucoma defect from the early stage to loss of central vision.

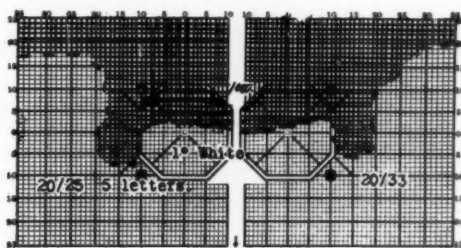
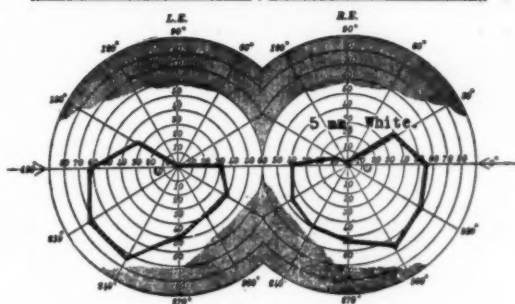


Fig. 8 (Lloyd). To show the more common involvement of the upper nasal field with comparative immunity of the lower nasal quadrant.



to function at all, is the case with very early involvement of the all-important fixing area. Just why the macular area should lose its immunity, or rather acquire a vulnerability, is not explained but the illustration shows (fig. 9) very plainly that in this particular case the scotoma flowing from the blind spot includes the foveal zone instead of passing around it, as is the rule. These cases are rare and difficult to control.

The explanation of the peculiar resistance of the macular area or, rather, the resistance of the papillo-macular bundle in the disc and as it passes over the sharp

tected by connective tissue spread along the central vessels in the nerve head.

Rydel offered a theory that held its own for a long while and has been but recently displaced. He pointed out that the vessels going to the periphery of the temporal retina traveled much farther than the vessels going to the nasal portion as the disc is displaced internally. The farther the vessels go, the finer they become and, according to the law of Poiseuille, because of friction of the corpuscles against the narrow walls, the circulation is very much delayed in the very small tubes. Thus in the finer ves-

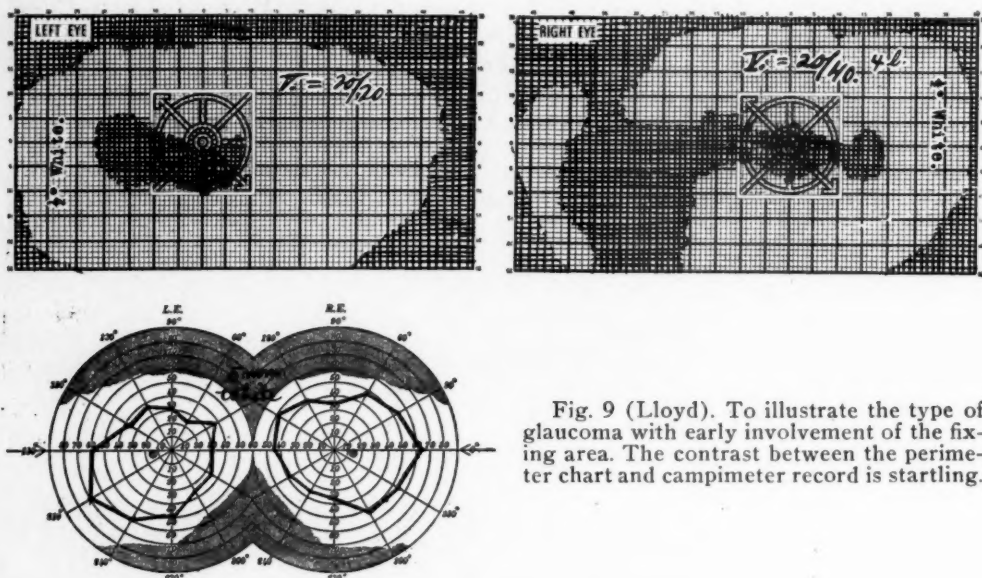


Fig. 9 (Lloyd). To illustrate the type of glaucoma with early involvement of the fixing area. The contrast between the perimeter chart and campimeter record is startling.

edge of the cupped disc, has been eagerly sought by clinician and pathologist. Donders suggested that the pressure affected the retinal circulation and the superficial nerve fibers. According to his idea, the papillo-macular bundle was placed deeply in the nerve and suffered less than bundles of superimposed nerve fibers supplying the temporal half of the retina. Leber believed that the peripheral supply of nerve fibers was located in the center of the nerve trunk and that these fibers were displaced to a greater extent by the pressure within the eye. Arlt thought the papillo-macular bundle was pro-

sels, one having a diameter one half as great as another, had a circulation rate not one half but one sixteenth of the larger.

Bunge, Pflüger, Schnabel, and others drew attention to the fact that the usual scotoma was a bundle defect and indicated pressure upon a definite group of nerve fibers and Bjerrum came to the conclusion that the critical point where this pressure was applied was the cupped margin of the disc. Elliot pointed out that the temporal half of the disc margin was covered by many more fibers than the nasal segment. Thus on the temporal half of the disc

are found as many fibers as pass over the nasal margin plus the very large number of fibers in the papillo-macular bundle.

Through studies of cases of opaque optic-nerve fibers and examinations of the fundus with red-free light, these fibers have been mapped very accurately, so it is an established fact that the papillo-macular bundle occupies the central two-thirds of the temporal margin of the disc (fig. 10). This leaves an upper sixth of the disc margin for the fibers supplying the upper quadrant of the temporal retina and a lower sixth for the fibers of the lower quadrant of the temporal retina. Quite naturally the fibers supplying non-macular areas are piled up in several layers which would expose them to pressure as they pass over the sharp edge of the cupped nerve head. This presupposes the effect as due to direct pressure applied to the nerve fibers at

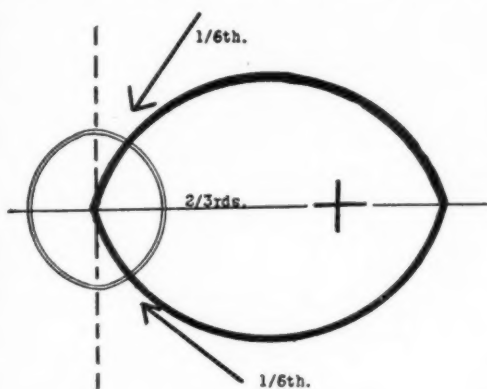


Fig. 10 (Lloyd). Diagram to show the narrow areas allotted to the fibers of the optic nerve supplying the upper and lower temporal quadrants of the retina, as they pass over the disc margin.

the disc margin. The Vienna school point out that the first effect of increased intraocular pressure observed by the microscope is exerted upon the ganglion cells and nerve-fiber layer of the retina and, as these layers are supplied by the central artery of the retina, it is the opinion of that group that the glaucoma defect is the result of pressure upon the blood vessels of the retina, which, in turn, produces an atrophy

of the peripheral bundles first. The macula escapes because there are no ganglion cells in the fovea and its blood supply comes from the choroid, which withstands the increase of pressure very well.

Wessely injected salt solution beneath the conjunctiva and demonstrated that there was at once an increase in the tonometer reading and a simultaneous enlargement of the blind spot. Samojloff carried these experiments further and found the pressure rising steadily for about one-half hour to a maximum where it remained for about ten minutes and then declined steadily to the normal figure, which was reached in about two hours from the initial moment of the injection. The increase in size of the blind spot followed closely upon the pressure increase but was some minutes behind it, reaching the climax about the end of the first hour and returning to normal with the tonometer reading.

"The early appearance of the glaucoma scotoma seems to depend upon a retinal oedema which is closely related to an increase of intraocular pressure and a lymph stasis in the perivascular spaces of the chief retinal veins."

Wegner considered this experiment as an attack of acute glaucoma in miniature because of the flow of richly albuminous lymph into the subchoroidal space and an edema of the choroid and retina. These phenomena cannot be observed with the ophthalmoscope. If steady pressure is applied to an eye, the intraocular pressure falls even in moderately glaucomatous eyes. Bonneton and Wegner laid 150- and 100-gram weights, respectively, upon the eye for one minute and found the tension dropping about one third while the blind spot was enlarged for about an hour afterward. They also took the tension of glaucoma-simplex eyes before and after instillations of pilocarpine and adrenalin and also before and after applying 100 grams of pressure to the eye with the upper lid interposed. Pilocarpine reduced the tension at once but had little effect upon the size of the blind spot; adrenalin had no effect upon the tension but reduced the size of the

blind spot; while external pressure applied to the eye lowered the pressure and increased the size of the blind spot. These findings with Wessely's experiments lead to the conclusion that the immediate effect of increased pressure within the eye is a stasis in the perivascular lymph spaces.

Evans has made a number of experiments and explains most visual-field changes as the result of fluid in these spaces. He has shown that the blind spot will increase in size after pressure is applied to a normal eye by the finger pressing upon the lid. In a case of pulsating exophthalmus, he was able to reduce the size of the enlarged blind spot to almost normal by pressure applied to the vessels of the neck on the affected side. This explanation fits in well with the evanescent character of the sickle scotoma of Seidel and the more permanent character of the comet defect and the nasal step.

According to this idea, glaucoma is the result of perivascular stasis and the enlarged blind spot can be produced without increase of tension by producing a stasis in the lymph channels. The first effect of the disease is a stasis in the perivascular spaces along the main vessel trunks as they leave the nerve. According to Behr there are also perifibrillar spaces, and while pressure increase is the inevitable effect of this stasis, we must look upon the scotoma of glaucoma as a simultaneous result of pressure and trophic damage to the nerve fibers and ganglion cells by the accumulation of fluid in the spaces about the blood vessels and nerve fibrils. Increased pressure within the globe must contribute something to the sum total of damage done, and the strategic point, where both the intraocular pressure and stasis along the vessel stalks and fiber bundles would operate most seriously for the welfare of the retina, could still be the sharp edge of the cupped disc where so many layers of nerve fibrils are crowded together at the upper sixth and the lower sixth of the temporal half of the sharp margin of the optic disc.

The tonometer has decidedly altered the status of this defect as a diagnostic

sign, but the uncertain effects of operative procedures in the later stages of the disease and the persistence of even 20/20 vision in a small macular area while the more peripheral fields are being wiped out have emphasized the importance of field studies as the only safe guide in deciding whether the patient is holding his own or slowly passing on to blindness. After the typical scotoma of glaucoma had been shown to spread from the blind spot in the early stages of increased intraocular pressure and the way to outline it in its very early months had been found, many hoped that it would be possible by blind-spot examinations to detect the very earliest stages of glaucoma simplex, perhaps even before cupping of the disc.

While few patients remain in the care of the same oculist during the preglaucoma days and into definite glaucoma, which no longer yields to miotics and requires operative measures, it has been my privilege to observe some half-dozen cases through this long period and, in all, the cupping of the disc preceded the increased tonometer reading and the appearance of typical field defects.

These observations were made some years ago before intraocular pressure had been well studied. If I had the opportunity of making these observations again, I would not depend upon tonometer readings made at intervals of one week over an extended period, nor would I be satisfied with readings daily for a week. But there was a time when I thought this was enough to satisfy the most critical. In order to say that cupping of the disc precedes tonometer rise today, one should have made a series of tonometer readings through several days at, say, 6-hour intervals. This procedure might fail to reveal the true state of affairs, for it is certain that in established glaucoma pressure readings run in waves of increase and decrease with periods of weeks or months between high points.

The mapping of field defects in glaucoma cases before and after the use of miotics often reveals the disposition of the individual case. As many glaucoma patients come to us only after the disease is well established and not infre-

quently with one eye blind and the vision of the second eye seriously impaired, some idea of the immediate future of that particular case can be gained by noting the effect of miotics upon the field outline and the defect extending from the blind spot, passing

above, or both above and below, the macular area. (Fig. 11). This will suggest the practical sphere of field studies in glaucoma but all time expended in examinations of the details of glaucoma defects will be well repaid.

14 Eighth Avenue.

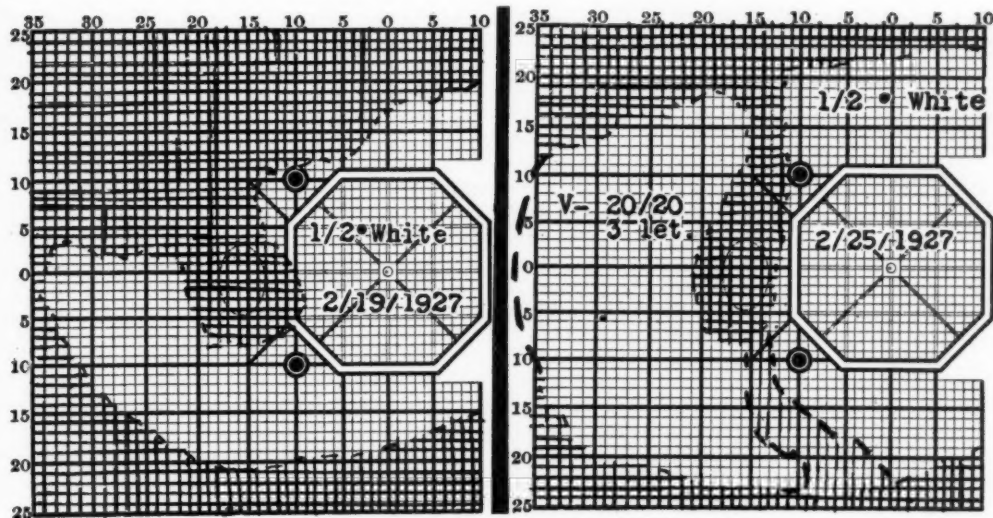


Fig. 11 (Lloyd). To show the effect of miotics upon an old case of glaucoma over a period of six days. Pressure reduced from 55 mm. to about 30 mm. (Schiötz). The other eye is blind. Vision = 20/20—3 letters.

Bibliography

GLAUCOMA

1856. v. Graefe. Examination of the fields of vision in amblyopic affections. Arch. f. Ophth., v. 2, pt. 2, p. 291.
1861. Haffmans. Kennen des Glaukoms. Arch. f. Ophth., v. 8, pt. 2, p. 125.
1869. v. Graefe. Pathologie und Therapie des Glaukoms. Arch. f. Ophth., v. 15, pt. 3, p. 108.
- Landesberg. Glaukom. Arch. f. Ophth., v. 15, pt. 1, p. 204.
1872. Rydel. Lehre vom Glaukom. Arch. f. Ophth., v. 18, pt. 1, p. 12.
1884. Bunge. Gesichtsfeld und Faserverlauf. Halle.
1885. Pflüger. Ophth. Gesellsch. zu Heidelberg, p. 94.
1887. Sachs. Glaukomatöse Sehnervenleiden. Zentralbl. f. prakt. Augenh., v. 11, p. 161.
1889. Bjerrum. Addition to general examination of the vision field and the field of vision in glaucoma. Scand. Ophth. Mag., v. 2, p. 141.
1892. Schnabel. Glaukomatöse Sehnervenleiden. Arch. f. Augenh., v. 24, p. 273.
1895. Bull. Perimetrie. Bonn, F. Cohen, p. 70.
1896. Baas. Das Gesichtsfeld. Stuttgart, F. Enke, p. 196.
- Simon. Periphere Skotome beim Glaukom. Zentralbl. f. prakt. Augenh., v. 20, p. 102.
1900. Meisling. Recherches sur l'examen du champs visuel avec les objets blancs d'angle visuel petit. Ann. d'Ocul., v. 124, p. 417.
1902. Friedenwald. Visual field in glaucoma. Ann. Ophth., v. 11, p. 157.
- Gallus. Frage des Ringskotoms. Ztschr. f. Augenh., v. 7, p. 361.
1905. Sinclair. Bjerrum's Method. Trans. Ophth. Soc. U. Kingdom, v. 25, p. 384.
1908. MacNab. Glaucoma Record. Ophth. Rev., p. 27.
1909. Rönne. Gesichtsfeld beim Glaukom. Klin. Monatsbl. f. Augenh., v. 47, pt. 1, p. 12.
1909. Rönne. Nasale Gesichtsfelddefekte beim Glaukom. Arch. f. Ophth., v. 71, p. 52.

1912. Sattler. Gesichtsfeld beim Glaukom. Ztschr. f. Augenh., v. 27, p. 33.
 Fleischer. Bjerrumsche Methode. Klin. Monatsbl. f. Augenh., v. 50, pt. 2, p. 62.
 Lange. Lehre vom Glaukom. Klin. Monatsbl. f. Augenh., v. 50, pt. 2, p. 540.
 1914. Löhlein. Visual fields in glaucoma. Arch. f. Augenh., v. 76, p. 165.
 Seidel. Frühdiagnose des Glaukoms. Arch. f. Ophth., v. 88, p. 102.
 1915. Van der Hoeve. Visual fields and operative methods in glaucoma. Ztschr. f. Augenh., v. 34, p. 277.
 Bissell. Visual fields in glaucoma. Jour. Ophth., Otol., and Laryn., v. 22, p. 646.
 1918. Elliot. Glaucoma. New York, Hoeber, p. 183.
 1920. Peter. Visual fields in glaucoma. Arch. of Ophth., v. 49, p. 309.
 1922. Elliot. Treatise on glaucoma. Oxford Med. Pub., p. 228.
 1927. Procksch. Beitrag zum Glaukomgesichtsfeld. Ztschrift. f. Augenh., v. 61, p. 344.

PRESSURE, BLIND SPOT, SIZE, ETC.

1872. Rydel. Lehre vom Glaukom. Arch. f. Ophth., v. 18, pt. 1, p. 12.
 1884. Bunge. Gesichtsfeld und Faserverlauf. Halle.
 1885. Pflüger. Ophth. Gesellsch. zu Heidelberg, p. 94.
 1887. Sachs. Glaukomatöse Sehnervenleiden. Zentralbl. f. prakt. Augenh., v. 11, p. 161.
 1908. Wessely. Experimentelle Untersuchungen über den Augendruck, etc. Arch. f. Augenh., v. 60, p. 130.
 1913. Verderame. Dell'effetto dell'iniezioni sotto congiuntivali di clouro di sodio sulla funzione oculaire dell'uomo. Ann. di Ottal., v. 42, p. 73.
 1915. Behr. Ueber die parenchymatöse Saftströmung im Sehnerven und in der Netzhaut. Arch. f. Ophth., v. 89, p. 295.
 1918. Elliot. Glaucoma. New York, Hoeber, p. 183.
 1921. Bonnefon. De l'ophtalmomalacie expérimentale. Ann. d'Ocul., v. 159, p. 762.
 1922. Elliot. Treatise on glaucoma. Oxford Med. Pub., p. 228.
 Samojloff. Untersuchungen über die Veränderungen der glaukomatösen Skotome bei intraokularen Druckschwankungen. Klin. Monatsbl. f. Augenh., v. 59, p. 59.
 1923. Magitot. Sur la tension oculaire et quelques-unes de ses modifications expérimentales. Ann. d'Ocul., v. 160, p. 1.
 Samojloff. Grössenzunahme des blinden Fleckes nach subconjunctivalen Kochsalzinjektionen. Klin. Monatsbl. f. Augenh., v. 70, p. 655.
 1924. Bleidung. Die Beziehungen zwischen allgemeinem Blutdruck, Blutdruck in den intraokularen Gefässen und Augendruck. Arch. f. Augenh., v. 96, p. 198.
 1925. Wegner. Kann Skotombildung allein durch Erhöhung des intraokularen Druckes bedingt sein? Ztschr. f. Augenh., v. 56, p. 48.
 1926. Samojloff. Weitere Untersuchungen über die Skotombildung. Ztschr. f. Augenh., v. 58, p. 282.
 1930. Evans. Interpretation of defects of visual field. Arch. of Ophth., v. 3, p. 153.

GONORRHEAL OPHTHALMIA

Statistical report of one hundred and eighty-nine cases

JAMES I. FARRELL, M.D.

UTICA, NEW YORK

The case records of 189 patients with gonorrheal ophthalmia, who were treated at the Massachusetts Eye and Ear Infirmary from 1916 through 1931 were reviewed to see if those who had a gonorrheal genital infection had a better prognosis as to the eye condition than did the others. Only records of patients over six months of age were considered and only those patients in whom at least two positive conjunctival smears were obtained. The conclusion is that the prognosis of a patient's gonorrheal ophthalmia cannot be judged by the presence or absence of a similar genital infection. From the Eye Clinic of the Massachusetts Eye and Ear Infirmary.

This review of cases of gonorrheal ophthalmia treated at the Massachusetts Eye and Ear Infirmary from 1916 through 1931 was undertaken at the suggestion of the late Dr. George S. Derby, who questioned the validity of the prevailing belief of the staff that a better prognosis could be given patients with gonorrheal ophthalmia if they also had a similar infection of the genito-urinary tract.

Only the records of patients over six months of age have been considered and only those cases in which at least two positive conjunctival smears were obtained have been reviewed.

The treatment of these patients, for the most part, consisted in boric acid (3 percent) irrigations followed by the instillation of argyrol (20 percent) and boric-acid ointment. This procedure was carried out half hourly or less frequently as the amount of discharge seemed to demand. All patients who showed any corneal involvement had atropine sulphate ($\frac{1}{2}$ or 1 percent) instilled at least three times a day. Infants were all restrained so that they could not turn the head to the unaffected side, and in the case of older patients the unaffected eye was always covered with a Buller shield. It was found necessary to do a Saemisch section or cover the cornea with a conjunctival flap in numerous instances. Several patients developed secondary glaucoma, which was relieved in all but one case by a filtering operation performed after the active Neisserian infection had been cleared up.

There were 189 case records studied in the compilation of the data for this

paper and 109 of them revealed the fact that the patient had, at the time of admission to the hospital, or had once had a gonorrheal venereal infection. The average number of admissions a year was 11.8, the lowest number admitted during one year was 6 and the highest 25. There were 135 patients (71.43 percent) who showed involvement of only one eye when admitted to the ward and of these only 8 (5.92 percent) developed an infection in the other eye. Three of these latter refused to leave the Buller shield in position and did not try to cooperate in following any directions given them and the remaining five were all below five years of age. Only 16 patients lost an eye by either enucleation or evisceration. The average length of stay in the hospital of all patients was 28.41 days; of those who had no venereal infection 27.41 days; and of those who had corneal involvement 33.80 days.

The first table gives a comparison of the number, percentage, and average length of stay in the hospital, by ages, of the patients who had a venereal infection and of those who did not.

In only a few instances was it possible accurately to trace the probable source of infection of those patients who had no urethritis or vaginitis. There were one doctor and three nurses who were caring for patients with a gonorrheal genito-urinary infection at the time they developed their ophthalmia. There was one child whose face had been washed with the common towel in a public lavatory. It was discovered that one little girl's older sister had a gonorrheal vaginitis. There were

three infants from an infants' asylum in the children's ward at one time, but no mention was made on their records as to the source of the infection.

To make this study as complete as possible the patients who had a venereal infection were divided into five groups to see if the stage of the infection had any bearing on the severity of the eye condition. The arbitrary divisions arrived at, with the help of the resident on the genito-urinary service of the Massachusetts General Hospital, were as follows: acute, chronic, chronic with superimposed acute, once had (cured), once had infection (cured) but have new acute infection. The next to last division consisted of patients who showed no evidence of a venereal infec-

tion. The patient Department of the Massachusetts General Hospital as soon as their ophthalmic infection was cured. Therefore, any longer hospitalization cannot be attributed to prolonged genito-urinary treatment.

Out of the total number of records studied, four were found of patients who had a gonorrheal infection of an orbit from which the eye had been removed at an earlier date. Two of these persons were between twenty and thirty years of age and two of them were over thirty. Only one of the four developed an infection in his only eye. He was a man 55 years of age, whose only eye showed a profuse discharge four days after the onset of symptoms in the socket. The cornea of this eye became

Table 1

Age	Patients who had no venereal infection			Patients who had a venereal infection		
	No. pts.	% all pts.	Aver. stay in hosp. in days	No. pts.	% all pts.	Aver. stay in hosp. in days
6 mo. to 2 yrs.	12	6.35	25.25	2	1.06	36.50
2 yrs. through 10 yrs.	37	19.58	21.16	28	14.81	23.43
11 yrs. through 15 yrs.	5	2.64	38.50	1	.53	12.00
16 yrs. through 30 yrs.	15	7.94	36.53	57	30.16	29.98
31 yrs. and over	11	5.82	33.36	21	11.11	34.62
Totals	80	42.33	27.41	109	57.67	29.42

tion at the time of admission to the Massachusetts Eye and Ear Infirmary, but who stated that they had had such an infection at some previous time. The last division was composed of patients who had apparently been cured of an acute genital infection five to ten years before but had an acute infection upon entry to the infirmary. Table 2 gives the number, percentage of all patients, and the average length of stay in the hospital in days, by ages, of the patients in these five arbitrary groups.

In table 2 all the patients in the two-years-through-ten-years group (28) were females, and of all the patients that came under this age group 48 out of the 65 were females.

It might be well to note here that patients with a venereal infection were discharged to the Genito-urinary Out-

involved, perforated, the lens escaped, and on discharge his vision was limited to shadows (unimproved) with good light projection. He did not have a venereal infection. The other three of these patients had genital infections, one an acute and the other two chronic.

In 16 cases it was found necessary to remove an eye due to panophthalmitis. Enucleations were performed in 7 (3.70 percent of all patients) and eviscerations in 9 (4.76 percent of all patients). Four of the patients had no genital infection, eight had an acute venereal infection, and four had a chronic one. Three of the patients were between 2 and 10 years of age, six between 16 and 30 years, and the other seven were over 35. Two of the children had a vaginitis. The percentage of all patients (8.46 percent) who had to have an eye removed

was much lower than anybody about the Eye and Ear Infirmary suspected. In studying these figures we found that 11.01 percent of the patients who had a genital infection had to have an eye removed and only 5 percent of those who did not have a venereal infection had to have an enucleation or evisceration. I could find no special reason why some eyes were enucleated and others eviscerated, it apparently being due to the surgeon's whim, for the pre-opera-

for showing whether or not those patients who had a genital infection had a better prognosis than those who had no such infection. The final vision was the last determination available. In some instances the patients were never seen again after being discharged from the ward, but in others the patients were seen several times, over a period of years, in the Out-Patient Department. In those cases in which the data seemed inadequate or a more recent test

Table 2

Division and age groups	No. pts.	% all pts.	Aver. stay in hosp. in days
Acute venereal infection	79	41.80	29.33
6 mo. to 2 yrs.	2	1.06	36.50
2 yrs. through 10 yrs.	26	13.76	23.50
11 yrs. through 15 yrs.	1	.53	12.00
16 yrs. through 30 yrs.	42	22.22	29.52
31 yrs. and over	8	4.23	49.12
Chronic venereal infection	19	10.05	32.16
2 yrs. through 10 yrs.	2	1.06	22.50
16 yrs. through 30 yrs.	8	4.23	34.37
31 yrs. and over	9	4.76	32.33
Chronic with superimposed acute infection	3	1.59	23.66
16 yrs. through 30 yrs.	2	1.06	16.00
31 yrs. and over	1	.53	39.00
Once had a venereal infection (cured)	3	1.59	18.66
16 yrs. through 30 yrs.	1	.53	26.00
31 yrs. and over	2	1.06	15.00
Once had a venereal infection but have new acute	5	2.64	28.00
16 yrs. through 30 yrs.	4	2.12	34.00
31 yrs. and over (left against advice)	1	.53	4.00

tive descriptions of the eyes were about the same.

There was a goodly number of patients who had no corneal involvement and of course there was no loss of vision in any of them. The third table summarizes the data of this group.

This table shows that those patients without a venereal infection (37 in number), for the most part got over their gonorrheal ophthalmia more rapidly than did those who had a genital infection.

The final vision of the patients in this series was taken as the best means

of the visual acuity was desired, letters, with the help of the Social Service Department, were sent to the patients, requesting them to return to a special clinic for further observation. Quite a few of the letters were returned because the whereabouts of the patients to whom they were addressed was unknown. However, a considerable number reported to the special clinics and in several instances it was found that patients who had very poor vision when last seen now had normal or almost normal sight, with correction. It was impossible to determine the vision of

Table 3

PATIENTS WHO HAD NO CORNEAL INVOLVEMENT

	No. pts.	% all pts.	Aver. stay in hosp. in days
Patients from 6 mo. to 2 yrs.	12	6.35	27.00
No venereal infection	10	5.29	25.00
Acute venereal infection	2	1.06	36.50
Patients from 2 yrs. through 10 yrs.	35	18.52	18.74
No venereal infection	20	10.58	17.10
Acute venereal infection	14	7.41	20.50
Chronic venereal infection	1	.53	27.00
Patients from 11 yrs. through 15 yrs.	2	1.06	9.50
No venereal infection	1	.53	7.00
Acute venereal infection	1	.53	12.00
Patients from 16 yrs. through 30 yrs.	20	10.58	24.00
No venereal infection	4	2.12	19.00
Acute venereal infection	13	6.88	25.23
Chronic venereal infection	2	1.06	29.00
Chronic with superimposed acute	1	.53	18.00
Patients 31 yrs and over	9	4.76	21.11
No venereal infection	3	1.59	20.33
Chronic venereal infection	3	1.59	31.66
Once had a venereal infection	2	1.59	15.00
Once had and have a new infection (This pt. left against advice)	1	.53	4.00
Total	78	41.27	21.38

many of the very young people, so their visual acuity was judged by the description of their corneae when last seen. To classify these data the following arbitrary division of the final visions was chosen:

Very poor or none.....
Blind to fingers at five feet
 Poor.....5/200 to just below 20/200
 Fair.....20/200 through 20/70
 Good.....20/50 through 20/30
 Excellent.....20/20 or better

It should be understood that all final visions are corrected visions.

Table 4 shows the final visions of all patients who had corneal involvement, classified by ages and as to whether or not they had a venereal infection.

As those patients who had no corneal involvement had as good vision on discharge as before they developed their infection their final vision was consid-

ered "excellent" even though it was cut down by old scars or an amblyopia. Therefore the total number of patients who left the hospital with excellent vision was 116 or 61.37 percent of all patients. On further analysis one finds that 60.55 percent of those patients who had a genital infection and 62.50 percent of those who had no such infection recovered with excellent vision, and that 7.34 percent of the patients who had a venereal infection and 8.75 percent of those who had no genital lesion recovered with good vision. The patients who left the hospital with fair vision included 4.59 percent of the patients who had a genital infection and 5.00 percent of the patients who had none, while 1.83 percent of the patients who had a genital infection and 3.75 percent of the patients who had no such infection were discharged with poor vision. The very-poor-vision group was

Table 4

	No venereal infection	Acute	Chronic	Chronic with acute	Once had	Once had and have
Excellent vision	12	20	2	0	1	3
6 mo. to 2 yrs.	1	0	0	0	0	0
2 yrs. through 10 yrs.	9	7	1	0	0	0
11 yrs. through 15 yrs.	1	0	0	0	0	0
16 yrs. through 30 yrs.	1	11	1	0	1	3
31 yrs. and over	0	2	0	0	0	0
Total—38 % all pts.—20.10						
Good vision	7	6	2	0	0	0
2 yrs. through 10 yrs.	2	2	0	0	0	0
11 yrs. through 15 yrs.	1	0	0	0	0	0
16 yrs. through 30 yrs.	1	3	2	0	0	0
31 yrs. and over	3	1	0	0	0	0
Total—15 % all pts.—7.94						
Fair vision	4	3	1	1	0	0
2 yrs. through 10 yrs.	2	0	0	0	0	0
16 yrs. through 30 yrs.	2	3	1	0	0	0
31 yrs. and over	0	0	0	1	0	0
Total—9 % all pts.—4.76						
Poor vision	3	2	0	0	0	0
2 yrs. through 10 yrs.	1	0	0	0	0	0
11 yrs. through 15 yrs.	1	0	0	0	0	0
16 yrs. through 30 yrs.	1	1	0	0	0	0
31 yrs. and over	0	1	0	0	0	0
Total—5 % all pts.—2.64						
Very poor or no vision	13	8	2	1	0	1
6 mo. to 2 yrs.	1	0	0	0	0	0
2 yrs. through 10 yrs.	3	0	0	0	0	0
11 yrs. through 15 yrs.	1	0	0	0	0	0
16 yrs. through 30 yrs.	5	6	0	1	0	1
31 yrs. and over	3	2	2	0	0	0
Total—25 % all pts.—13.23						

made up of 11.01 percent of the patients who had a urethritis or vaginitis and 16.25 percent of the patients who had no venereal disease.

In this series of cases there were eight whose condition was further complicated by arthritis. All of these patients had an acute venereal infection, although one of them had had a previous infection which had been successfully treated. Only one of them escaped without having corneal involvement. Five had excellent vision on discharge, one fair, one very poor, and one lost an eye by evisceration. The average length of stay in the hospital of these patients was 27 days.

One patient who developed a severe

sore throat with a temperature between 103°F. and 104°F. for thirty-six hours left the infirmary with excellent vision, in spite of the fact that he had a large flat ulcer involving the lower third of his cornea. This patient did not have a urethritis. His stay in the hospital was 47 days.

Foreign-protein therapy was used in fifteen cases. For this purpose three different types of protein were used; namely, diphtheria antitoxin, typhoid vaccine, and milk. All of these were given intramuscularly, but the amount varied with each patient. The total amounts of diphtheria antitoxin used ranged from 15,000 units to 160,000 units; of typhoid vaccine from 2 am-

pules to 6 ampules; and of milk (Aolan) from 30 c.c. to 90 c.c. Only two patients were given two different kinds of protein and both of these received injections of typhoid vaccine and Aolan. One patient who received 45,000 units

ly three male patients to every female. It was found that 55.03 percent of all the patients admitted to the contagious ward of the infirmary with a gonorrheal ophthalmia were older than 15 years of age, and that 38.62 percent of all the pa-

Table 5

	Diphtheria Antitox.	Typhoid Vacc.	Aolan (Milk)
Total number of patients	9	5	3
A. Who had no venereal infection	6	1	2
B. Who had a venereal infection	3	4	1
Acute	1	2	1
Chronic	2	2	0
C. Who had no corneal involvement	3	1	0
D. Who had corneal involvement	6	4	3
Recovered with good vision	1	1	0
Recovered with poor vision	1	0	0
Recovered with very poor vision	4	1	3
Lost an eye by evisceration	0	2	0
Average period of hospitalization, in days	40.66	39.00	42.66

of diphtheria antitoxin was also given five intramuscular injections of his own whole blood, 15 c.c. being given each time. The fifth table summarizes these cases.

One of the patients who received four intramuscular injections of typhoid vaccine was also given eleven subconjunctival injections of Pregel's solution, ten minims each time. Her cornea underwent perforation near the periphery and was then covered with a conjunc-

tients were between the ages of 16 and 30 years. The last table compiled was for the purpose of comparing the sex incidence and to show whether or not a venereal infection was more common in male or female patients.

Summary

1. Case records of 189 patients with gonorrheal ophthalmia have been reviewed to see if those patients who had a gonorrheal genital infection recov-

Table 6

	Male		Female	
	Had a venereal infection	Had no venereal infection	Had a venereal infection	Had no venereal infection
6 mo. to 2 yrs.	0	5	2	7
2 yrs. through 10 yrs.	0	17	28	20
11 yrs. through 15 yrs.	0	3	1	2
16 yrs. through 30 yrs.	48	9	10	6
31 yrs. through 50 yrs.	11	4	5	4
51 yrs. and over	3	1	1	2
Totals	62	39	47	41

tival flap. She had a chronic endocervicitis. Her vision on discharge was 20/30.

There were approximately two female patients to every male patient admitted below the age of 15 years but older than this there were approximate-

ered more quickly and with fewer complications than the others.

2. In 109 of these cases there was a venereal infection.

3. The average period of hospitalization was 28.41 days; of those with no

venereal infection 27.41 days, and of those who had a genital infection 29.42 days.

4. Of the 116 patients who recovered with excellent vision, 67 (57.76 percent) had a venereal infection.

5. Of the 15 patients who recovered with good vision, 8 (53.33 percent) had a genital infection.

6. Of the 9 patients who recovered with fair vision, 5 (55.55 percent) had a venereal infection.

7. Of the 5 patients who recovered with poor vision, 2 (40.00 percent) had a venereal infection.

8. Of the 25 patients who recovered with very poor vision, 12 (48.00 percent) had a venereal infection.

9. Of the 16 patients who lost an eye by enucleation or evisceration, 12 (75 percent) had a genital infection.

10. There were four patients who had an infected socket but only one of these

had an infection of his only eye, and he was the only one who did not have a genital infection.

11. Fifteen patients received foreign-protein therapy but the results were not encouraging.

12. Of the 135 patients who had an infection of only one eye on entry, only 8 (5.92 percent) developed an infection of the other eye.

Conclusion

The prognosis of a patient's gonorrheal ophthalmia cannot be judged by the presence or absence of a similar genital infection.

I wish to express my gratitude to Dr. Edwin B. Dunphy of Boston for his encouragement and advice in the writing of this paper.

250 Genesee Street.

A CORRELATION BETWEEN PUPILLARY AREA AND RETINAL SENSIBILITY

M. LUCKIESH AND FRANK K. MOSS
CLEVELAND

An analysis of the experimental data from fifteen subjects indicates that the variation in retinal sensibility between the subjects is of the same order as the variation in the areas of the natural pupils. It is also evident that pupillary area and retinal sensibility are opposing factors with respect to their possible influence upon the level of illumination selected by an introspective appraisal of seeing. In general, the subjects with the larger pupils usually have the lower retinal sensibility, and *vice versa*.

Differences in pupil size and in retinal sensibility account only in part for the wide differences in levels of illumination selected as "desirable" by various subjects for a given critical visual test, such as reading. Apparently these differences are not chiefly due to physiological factors associated with the visual sense. From the Lighting Research Laboratory of the General Electric Company.

If subjects are asked to select, by actual trial, the intensity of illumination considered most suitable for long periods of exacting visual work, such as reading, a conspicuous characteristic of the data thus obtained is the disagreement between individual selections. It is reasonable to assume that these differences in levels of illumination arise from complex combinations of psychological and physiological causes. Individual variations in pupillary area and retinal sensibility are obvious physiological factors which may have a bearing upon the intensity of illumination selected as the optimum. It is the purpose of this discussion to appraise the influence of these factors in this respect.

Although there is some evidence¹ to indicate that the light entering the pupil at different points is not equally effective, it may be assumed for the purposes of this discussion that the effective retinal illumination is proportional to the area of the pupil. Hence, due to differences in the size of the natural pupils, the intensities of illumination preferred by various subjects of normal or near-normal vision might be expected to vary over a range of three or possibly four to one. However, this range in levels of illumination, apparently justified by differences in pupillary area, is subject to modification, due to possible differences in absolute retinal sensibility to visible radiation.

Minimum perceptible brightness-difference was selected as a criterion for determining retinal sensibility. This criterion may be regarded as a comprehensive one, since it involves one of the

two inherent characteristics of vision; namely, the sensations of brightness and of color. The factor of color may logically be omitted from consideration in this discussion, since color and color-contrasts were not involved in the selection of the preferred intensity of illumination for the critical visual task of reading. The variation in retinal sensibility between subjects was investigated by determining minimum perceptible brightness-difference monocularly through an artificial pupil, thus eliminating the effect of individual differences in pupillary area. Similar measurements were also made for vision through the natural pupil.

The principal elements of the apparatus consist of (A) a device for projecting a circular image of variable brightness upon a white screen and (B) a device for accurately registering an artificial pupil with respect to the natural pupil of the right eye. This apparatus is illustrated in figure 1. The brightness of the projected image is controlled by varying the position of a miniature lamp in the tube, *A*, of the instrument with respect to a diaphragm with a circular aperture located at the focus of the objective lens system. This arrangement permits a wide variation in the brightness of the test-object image without introducing changes in the color of the light. The adjustment of the brightness of the image is made by rotating a knob conveniently located for operation by the right hand of the subject.

The apparatus for registering the artificial pupil with respect to the natural

pupil is similar in principle to that described by Troland². This device is shown at *B* in figure 1. Essentially, it consists of an arrangement whereby two circles of light are made to appear concentric when the artificial pupil and the natural pupil are in exact register. The larger of the two concentric circles of light is formed by light reflected from the inner walls of the tube near the eye and producing a diffusion image of the artificial pupil upon the retina. The smaller circle of light is formed by the image of a circular opening in a diaphragm at the end of the tube opposite the pupillary diaphragm. The light which produces the larger circle is reflected into the telescoping tube by means of a piece of clear plate glass inclined at an angle of 45 degrees with the line of vision. This light is present only in the process of registration and is controlled by a key conveniently located near the left hand of the subject. Monocular vision was secured by placing a small opaque screen in front of and near the left eye. This screen is not shown in the illustration.

The pupillometer used in this research is described in detail elsewhere³. With this instrument the diameter of the pupil is measured by the distance between two pin-points of light so located and separated that the images of the pupil cast upon the retina appear tangential. The subject wears the instrument as ordinary eyeglasses are worn, fixates upon a definite object and adjusts the distance between the two points of light for tangency of the retinal images.

After making the necessary adjustments of the head-rest and the device for registering the artificial pupil, the subjects were allowed a 15-minute period for adaptation to the brightness of an illuminated field located at a distance of 2 meters from the artificial pupil. A wall of the room, painted a flat white and illuminated to a brightness of one millilambert, constituted the general visual field upon which was projected a circular spot of light one centimeter in diameter. This circle of light, in contrast with its background, was the test object for determining

minimum perceptible brightness-difference. Immediately following the adaptation period, a series of 5 measurements of the diameter of the pupil of the right eye was made. These measurements were repeated at the conclusion of the test.

The subject then registered the natural and artificial pupils and decreased the brightness of the test object until the threshold condition of brightness-

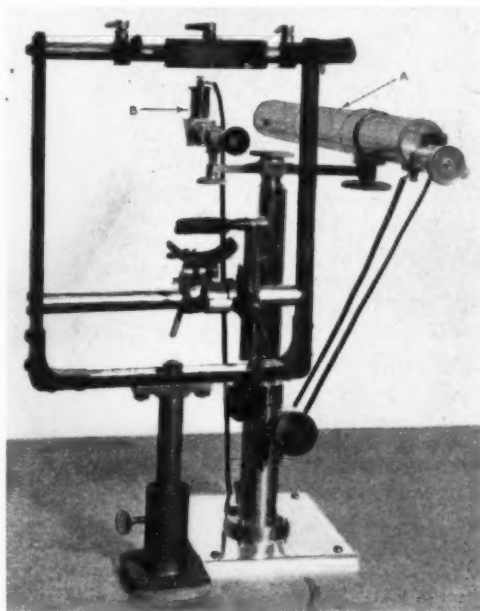


Fig. 1 (Luckiesh and Moss). The apparatus for measuring minimum perceptible brightness-difference. The essential features are (A) a device for projecting a circular spot of variable brightness upon a large white screen; and (B) a device for registering the artificial and natural pupils.

contrast was reached. A series of 5 such settings was made; the threshold was then approached from a subthreshold condition of brightness-contrast and a second series of 5 settings was made. Finally, a third series of measurements was made by adjusting the brightness of the test object alternately above and below the threshold value, as in photometry, until the threshold condition was reached. These measurements involved monocular vision and an artificial pupillary area of one square millimeter. A similar series of 15 measure-

ments was then taken with the natural pupil.

The results of this investigation between pupillary area and retinal sensibility are condensed in the accompanying table.

It will be noted from these data that the threshold values of brightness-contrast for monocular vision through the artificial pupil varied from 0.066 to 0.158 millilambert, respectively. Thus the variation in retinal sensibility between the subjects is of the same order as the variation in areas of the natural pupils. Since retinal sensibility may be consid-

that low retinal sensibility is an *a priori* cause of large natural pupils, since the receptors for the pupillary light reflex and vision are considered to be identical.

Measurements of minimum perceptible brightness-difference for monocular vision through the natural pupil also indicate that differences in pupil size and retinal sensibility are not predominating causes for the wide range in preferred levels of illumination. The coefficient of correlation between these factors is 0.29 with a corresponding probable error of 0.16. These data indi-

A COMPARISON OF PUPILLARY AREA AND RETINAL SENSIBILITY AS DETERMINED BY BRIGHTNESS-DIFFERENCE FOR 15 ADULT SUBJECTS

The various tests for each individual were taken on different days. Each test represented a series of 10 pupillary and 15 retinal sensibility measurements, respectively.

Subject	Number of Tests	Diameter of Pupil Millimeters	Minimum Perceptible Brightness-Difference in Millilamberts	
			Artificial Pupil	Natural Pupil
1	5	3.76	0.066	0.043
2	5	4.12	.099	.042
3	2	4.27	.081	.041
4	5	4.91	.136	.041
5	2	4.95	.116	.061
6	1	4.95	.093	.047
7	2	4.97	.120	.044
8	2	5.07	.094	.034
9	2	5.62	.141	.057
10	2	5.71	.096	.039
11	2	5.78	.089	.057
12	2	5.85	.125	.072
13	2	6.22	.132	.043
14	5	6.29	.115	.041
15	5	6.69	.158	.055

ered as the reciprocal of minimum perceptible brightness-difference, it will also be noted that pupillary area and retinal sensibility are opposing factors with respect to their possible influence upon the level of illumination selected by an introspective appraisal of ease of seeing. The coefficient of correlation between these factors is 0.61 with a corresponding probable error of 0.11. It is evident from this statistical analysis of the experimental data that the correlation between these factors is well defined. Hence it may be concluded that subjects with the larger pupils very generally have the lower retinal sensibility and *vice versa*. It is conceivable

cate that the correlation between pupil size and minimum perceptible brightness-difference is not well defined for vision through the natural pupils.

It is obvious from these considerations that differences in pupil size and in retinal sensibility account only in part for the wide differences in levels of illumination selected as "desirable" by various subjects for a given critical visual task, such as reading. Apparently these differences are not chiefly due to physiological factors associated with the visual sense. They must be due largely to differences in attitude, in habit, in experiences with lighting indoors, in esthetic sensibility and con-

siderations, and, in fact, to complex psychological causes. Nearly everyone is well satisfied with high intensities of daylight near a window for the task of reading. That the eyes and the human seeing-machine evolved outdoors under intensities of illumination far higher than those selected from artificial sources indoors lends at least philosophical support to the conclusion that the selections of "desirable" levels of illumination are *not* based upon definite physiological visual factors to any great extent.

The perennial example of human beings who are products of an outdoor environment, in which hundreds and even thousands of footcandles are prevalent, working indoors under a maximum of a few footcandles with ap-

parent satisfaction has long been a mystery that has received little attention. However, recently a broader and more sweeping scientific attack⁴, based upon seeing as *an activity of human beings*, as contrasted with merely the study of the abilities and limitations of vision, is dissolving this mystery. The facts are that human beings are poor judges of conditions best for seeing, and that their selection of intensities of illumination that they consider desirable is based largely upon habit, and habit is largely a matter of what they have been used to or have had available indoors.

Acknowledgment is hereby made to Mr. L. L. Holladay, who faithfully attended to the tedious details during the prosecution of this research.

Nela Park.

References

- ¹ Styles, W. S., and Crawford, B. H. The luminous efficiency of rays entering the eye pupil at different points. *Illum. Eng.*, 1933, v. 26, p. 116.
- ² Troland, L. T. The theory and practice of the artificial pupil. *Psych. Rev.*, 1915, v. 22, p. 167.
- ³ Moss, F. K. A modified Broca pupillometer. *Jour. Opt. Soc. Amer.*, 1932, v. 22, p. 735.
- Luckiesh, M., and Moss, F. K. Size of pupil as a possible index of ocular fatigue. *Amer. Jour. Ophth.*, 1933, v. 16, p. 393.
- ⁴ Luckiesh, M., and Moss, F. K. Seeing—a partnership of lighting and vision. Baltimore, Williams and Wilkins Co., 1931.

DELIMITING KERATOTOMY

HARRY GRADLE, M.D., AND SANFORD R. GIFFORD, M.D.
CHICAGO

The authors recommend this procedure, which consists of an incision made completely through the cornea, tangential to the advancing border of the ulcer. It is effective in arresting an ulcerative keratitis that does not yield readily to the usual methods of treatment. From the Department of Ophthalmology, Northwestern University Medical School. Presented before the American Academy of Ophthalmology and Oto-laryngology in Boston, September, 1933.

The purpose of this paper is to call attention once more to a procedure which we believe is exceedingly valuable in the treatment of various types of severe ulcerative keratitis. The procedure was described by H. Gifford in 1918¹ and again by one of the authors in 1922, 1931, and 1932². We have never seen it employed in other clinics, however, and no reports of its use by other observers have appeared, so that it has not, apparently, been accepted by the majority of ophthalmologists as a procedure of choice.

Delimiting keratotomy consists in an incision made completely through the cornea, tangential to the advancing border of the ulcer. After anesthesia is secured by injecting a few minims of 2-percent cocaine over the site of one of the recti muscles and near the opposite limbus, fixation is secured by grasping the insertion of the rectus through the conjunctiva with fixation forceps. A small, thin, very sharp Graefe knife is inserted just outside the widest portion of the ulcer, on the tangential line described, and passed through the cornea so as to come out at an equal distance from the opposite side of the ulcer. The knife is held parallel to the corneal surface as soon as it penetrates the cornea, so as not to wound the lens and the cut is completed slowly. It should be just in front of, but should not quite touch the advancing border of the ulcer, which is usually its central border. The pupils should be first dilated with atropine, and if the chamber is emptied slowly there should be no danger of iris prolapse (fig. 1).

The procedure is a modification of the Guthrie-Saemisch incision which was performed to forestall spontaneous perforation of very severe and exten-

sive serpent ulcers, and to imitate the effect that is seen after such perforation, when many ulcers heal spontaneously. The principle involved is the production of a marked hypotony, removing the cornea from the balance of pressure in which it is held between the

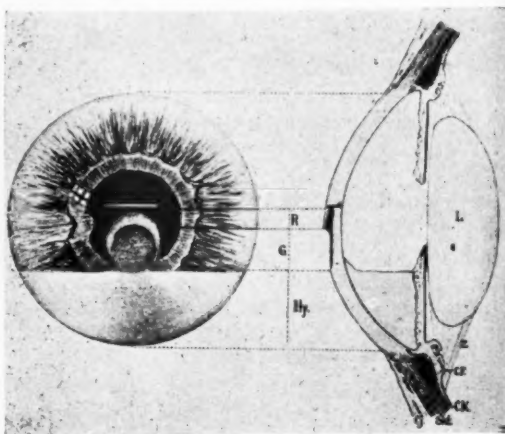


Fig. 1 (Gradle-Gifford). The cut is shown slightly too far from the margin of the ulcer. It should be just tangent to the advancing border. (Adapted from Axenfeld.)

atmosphere and the aqueous, and resulting in an increased supply of lymph and anti-bodies reaching it from the limbus. Brückner³ showed that marked hypotony, whether produced by trephining or gross loss of vitreous, increased the amount of anti-bodies (hemolysins) present in the cornea and aqueous of experimental animals. It has been shown by Hagen, Löwenstein, and others that the aqueous formed after paracentesis is much richer in albumen and anti-bodies than the primary aqueous. The Guthrie-Saemisch incision, an incision completely across the center of the ulcer, was employed, chiefly in very extensive ulcers, as a

last resort. While it resulted in saving a number of eyes, the visual results were necessarily meager, and in some cases the large incision resulted in expulsion of the lens or even of vitreous.

Other modifications of this incision have been based on the same principle of producing hypotony. The Sondermanns⁴ say of their trephine, that the smaller opening averts danger of prolapse of the lens, and that a round opening will remain open for a number of days, maintaining continuous hypotony. They report 75 cases of serpent ulcer in which this procedure was employed. Seventy-one of these healed with no further progress. The only complications attributed to the procedure were anterior synechiae in 12 cases, 9 requiring iridectomy or cyclodialysis later for secondary glaucoma. In one case cataract developed. They report that the procedure has proved of value in other types of keratitis, such as severe phlyctenular and marginal ulcers. The Sondermann procedure has been employed by a number of European ophthalmologists. A. Fuchs⁵ insists on its great value in serpent ulcers and reports an unusually severe herpetic ulcer which healed after its use. Others have been deterred by fear of injuring the lens, perhaps due to Sallman's⁶ report of a case in which injury of the capsule resulted in swelling of the lens and panophthalmitis. The fear that a permanent fistula will result seems not to have materialized, but Lindner (quoted by Fuchs) saw the chamber remain empty for 3 weeks in one case, with resulting glaucoma. Sondermann applies iodine to the surface of the ulcer before trephining to avoid carrying infection into the eye, but believes there is practically no danger of this, as the aqueous rushes out as soon as puncture is made, carrying with it any possible source of infection.

A simpler method of producing the same result is that of puncture through the ulcer with the actual cautery. This insures sterility of the point which enters the chamber, and the opening may be made less large than by use of the trephine. It remains open, however, 4 to 7 days, which is often long

enough to check the infection. There is also almost no danger of injuring the lens with the cautery. Pacalin⁷ is a recent advocate of this method. De-lord⁸ employs cautery puncture in all severe ulcers. He repeats it twice a day for 3 days, after which the opening usually remains patent for 10 days. He reports 12 cases of serpent ulcer, all of which healed with useful vision.

Probably the means of producing hypotony most commonly employed is paracentesis at the limbus. Hoffmann⁹ performs it early in serpent ulcer, making a cut which includes $1/5$ of the cornea so that it may be reopened with the speculum. Blaickner¹⁰ employs it in severe ulcers and Fuchs reports a case of Mooren's ulcer in which repeated marginal paracentesis brought about healing. Weeks¹¹ advocates opening the chamber by one of these several methods whenever any signs of increased tension develop. The chief disadvantage of limbic paracentesis is that it cannot usually be reopened and that each time it is reopened careful anesthesia and fixation are required. The chamber usually refills within half an hour after paracentesis unless a large incision is made, in which case there is danger of iris prolapse.

While it is recognized by many ophthalmologists that some form of paracentesis is useful in serpent ulcer, it is generally reserved for unusually severe cases and performed too late for the preservation of useful vision. Thus in a series of 117 serpent ulcers from the clinic at Lund, Glimstedt¹² reports that paracentesis or trephining was performed in only 11 cases. Of the whole series, enucleation was necessary in 4.5 percent, while 20 percent resulted in blindness of the affected eye.

Delimiting keratotomy has proved of value in the following types of ulcer: serpent ulcer, Mooren's ulcer, severe phlyctenular ulcer and ulcerative keratitis in trachoma, especially ring ulcer.

The advance of the infected border in the serpiginous type of ulcer presents the principal menace to vision, as this advance is nearly always toward the pupillary center. If the condition can be seen before the pupillary area is cov-

ered, the progress of the ulcer in this direction may be stopped by delimiting keratotomy.

Case 1. Geo. M., aged 33 years, showed a typical serpent ulcer of the left cornea following the entrance of a foreign body. The ulcer progressed un-



Fig. 2 (Gradle-Gifford). Case 1. Typical serpent ulcer of the left cornea.

der the usual measures, cauterization with iodine and solid mercurochrome, until it reached $3\frac{1}{4} \times 4$ mm. in size. Ten days after the injury delimiting keratotomy was performed and the chamber was reopened daily for 3 days. There was immediate relief of pain, and no further progress of the ulcer occurred. The patient returned to work 8 days after keratotomy. Vision 4 months later was 20/20 with correction (fig. 2).



Fig. 3 (Gradle-Gifford). Case 1. Twelve days after keratotomy.

Case 2. Harry I., a man of 35 years, was seen with a typical serpent ulcer 3×4 mm. in diameter. Vision was 2/200. Hypopyon was 2-3 mm. high. Keratotomy was performed 24 hours later and the chamber was opened on the two succeeding days. The hypopyon had disappeared in 24 hours and

the ulcer healed promptly. Twelve days after keratotomy vision was 20/25 with correction (fig. 3).

Case 3. M. R., a diabetic male aged 55 years, was seen with an ulcer of 5 days' duration, involving the lower half of the left cornea. Vision = 4/200. Despite foreign-protein injections and local treatment the ulcer progressed slowly. On the 7th day delimiting keratotomy was performed and the wound was kept open for 3 days. On the 10th day the ulcer no longer stained. Six months later vision with correction was 20/50 and Jaeger 1 (fig. 4).

Of the type of ulcer seen after most of the cornea is involved, but with persisting pain and inflammation, the following is an example.

Case 4. Mrs. I. J., aged 25 years, showed an ulcer $9 \times 4\frac{1}{2}$ mm. in size in-

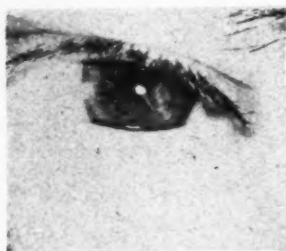


Fig. 4 (Gradle-Gifford). Ulcer six months after treatment.

volving $2/3$ of the cornea. She had been treated for 6 weeks elsewhere but pain was still so severe that the patient requested enucleation. Delimiting keratotomy was performed through the upper edge of the ulcer, and the chamber was kept open for 4 days. Pain ceased within 24 hours, and the ulcer was covered with epithelium within 8 days. Figure 5 shows the ulcer 8 days after keratotomy and figure 6 shows it 10 days later. The upper part of the cornea has cleared considerably and some useful vision may be obtained by iridectomy.

In eight other cases of typical serpent ulcer, delimiting keratotomy has been performed within the past 3 years. In all cases the ulcer was arrested and healed promptly, the resulting vision depending on the size of the ulcer when the case was seen (see table). Many were

seen when a large part of the cornea was involved.

Mooren's, or chronic serpiginous ulcer, usually presents a very gloomy prognosis. One of us (S.R.G.) has recently reported¹³ 3 typical cases of this condition, 2 of which healed following delimiting keratotomy with vision of 20/25 and 20/40. A third case healed with the use of a sliding conjunctival flap. Of the two procedures, keratotomy is much less disfiguring and presents greater chances for success, since many authors report failure after a conjunctival flap. In this condition the chamber must be kept open for 10 to 14 days or longer to avoid the possibility of recurrence.

In phlyctenular ulcers, keratotomy is seldom necessary, but occasionally a

became more opaque, but then began to clear, and after a year vision was 20/100, with correction.



Fig. 6 (Gradle-Gifford). Case 4. Ulcer eighteen days after keratotomy.

Three days after the keratotomy a similar central ulcer appeared on the right cornea and progressed in spite of local treatment. Keratotomy was performed on this eye at once and the ulcer healed in 5 days. Vision a year later was 20/25. (See figure 7.)

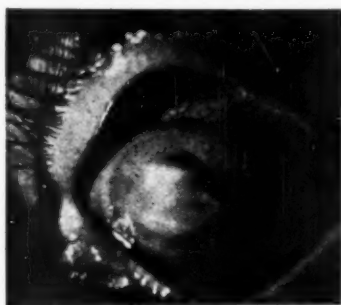


Fig. 5 (Gradle-Gifford). Case 4. Ulcer eight days after keratotomy.

central phlyctenule progresses deeply into the cornea, perhaps due to secondary infection, and threatens serious visual damage. When such cases occur in young children it may be impossible to make local applications without general anesthesia. In such cases, delimiting keratotomy or a small incision through the ulcer itself usually arrests the progress of the ulcer promptly and obviates the need of further anesthetics.

Illustrative of such a condition is case 5. George K., a boy of 8 years, had been treated for phlyctenular keratoconjunctivitis of the left eye. A central phlyctenule appeared, and progressed rapidly into the deeper corneal layers, and in all directions from the center. Keratotomy was performed and the chamber opened twice a day for a week. During the first few days the cornea



Fig. 7 (Gradle-Gifford). Central phlyctenule one year after treatment.

In the course of trachoma, there often develops at the edge of the pannus a group of punctate infiltrations which coalesce to form a large ulcer. This progresses rapidly across the cornea, followed by the vessels of the pannus. When the pannus encroaches on the cornea, not only from above but from the whole corneal circumference, the coalescence of the punctate infiltrates forms a ring of infiltration which, if

treated by the usual measures, results in almost complete opacity of the whole central cornea. This occurs chiefly in late cases of trachoma when the lids are almost or completely healed.

Case 6. Mark H., a man of 60 years, had been treated for trachoma for 12 years. According to the history submitted by his ophthalmologist, one-and-a-half years before, the right eye had developed a ring ulcer and required enucleation after 3 months. When seen by one of us, the left eye had shown ulceration for 6 days. A ring of infiltration



Fig. 8 (Gradle-Gifford). Cornea six weeks after keratotomy for ring ulcer.

surrounded the cornea except for an area above, 3 mm. in length. About 5 mm. of the central cornea was not involved in the ulcer but was very hazy. Vision was counting fingers at 2 feet. Keratotomy was performed at once, at the central border of the infiltrated area nearest the outer limbus. This was kept open for 9 days when the central cornea had cleared and the infiltration seemed to have stopped. It was allowed to close; but infiltration was renewed near the lower limbus, so a new opening was made and kept open 7 days, at which time the ulcer no longer stained. There was no recurrence and

vision one year later was 20/25. Figure 8 shows the cornea 6 weeks after keratotomy.

Case 7. Eli J., a patient with old trachoma, developed a similar ring ulcer while under treatment. Keratotomy was performed promptly, and the chamber reopened daily for 13 days. The ulcer healed readily and vision after 2 months was 20/30.

The more common type of keratitis occurring in trachoma, which was first described, may be illustrated by 2 cases.

Case 8. Emil M., a patient with old but still active trachoma, developed on two different occasions dense infiltrates at the border of the pannus, which progressed centrally. Keratotomy was performed each time and the incisions kept open for 7 days. Healing was prompt. Vision was only 20/200 uncorrected, due in large part to extensive vascular pannus.

Case 9. Lena K. developed a rapidly progressive ulceration at the border of a pannus, following an application of diathermy to the upper lid for active trachoma. Keratotomy was performed and the chamber kept open for 8 days. The cornea cleared rapidly and vision 2 weeks later was 20/30.

A number of other ulcers in trachoma have been treated in the same way, with similar results, the ultimate vision depending largely on the previous condition of the cornea (see table). In many cases, the keratitis is of a milder type, which responds rapidly to local applications of trichloroacetic acid and phototherapy.

The following table shows the visual results obtained in this small series of cases:

Table 1

Name	Type ulcer	Vision
Geo. M.	Serpent	20/20
Harry I.	Serpent	20/25
M. K.	Serpent	20/50
Mrs. I.	Serpent	hd. mvts.
Mr. R.	Serpent	c.f. at 2 ft.*
Ziggy G.	Serpent	(child; vision not obtained)
May W.	Serpent	5/200
Joseph W.	Serpent	hd. mvts.*
Emil S.	Serpent	cf. at 2 ft.*
Manuel G.	Serpent	1/10 (after iridectomy)
Mr. J.	Serpent	8/200*

* Could be improved by iridectomy.

Table 2

Name	Type of Ulcer	Vision
Fannie D.	Mooren's	20/40
Mr. D.	Mooren's	20/25
George K.	Sever central phlyctenules	{ R. 20/25 L. 20/100
Mark H.	Ring ulcer in trachoma	20/25
Eli J.	Ring ulcer in trachoma	20/30
Emil M.	Progressive ulcer in trachoma	20/200
Lena K.	Progressive ulcer in trachoma	20/30
Mr. S.	Progressive ulcer in trachoma	hd. mvts.
John O.	Corneal abscess after injury	20/100
Harry N.	Ring ulcer, unknown origin	c.f. at 3 ft.

Discussion

When a serpent ulcer has progressed to involve the central portion and a large part of the periphery of the cornea, delimiting keratotomy is contraindicated because it must be performed where the iris would prolapse. Here puncture in the central portion of the cornea with the actual cautery is to be preferred. Such an opening, if it can be made large enough, will allow the aqueous to drain for several days without further manipulation. This type of perforation has the disadvantage of causing a dense central scar.

In many instances gas anesthesia may be necessary for delimiting keratotomy, although local anesthesia, as previously described, is usually sufficient. There is often severe pain when the chamber is first opened, so that a preoperative injection of morphine is advisable. Before performing keratotomy, the conjunctiva should be well flushed, and a thorough application made to the cornea of any bactericidal agent which is customarily used, since it is difficult to make such an application after the chamber is opened. It is scarcely necessary to add that suppuration of the tear sac when present must be dealt with before incising the cornea. The pupil must be dilated *ad maximum* before keratotomy. Reopening of the

keratotomy wound daily or, in severe cases, twice daily, should be continued until all signs of activity have disappeared. This is easily accomplished, after cocaine instillation, with a small spatula or Darling cystotome.

In no case was the lens injured by the procedure, nor did any other complication attributable to it occur. In no case did iris prolapse occur. An adhesion of the iris to the lower portion of the cornea developed in one case, due to organization of an unusually dense hypopyon. Vision was 1/10 after iridectomy.

Summary

1. Progressive-suppurative disease of the cornea is best arrested by delimiting keratotomy, the incision passing through the cornea tangential to the progressive border of the ulcer.

2. The good effect is due to the resulting hypotony with consequent increase in anti-bodies and nutritional elements reaching the cornea, and perhaps also to the epithelial barrier which lines the margins of such incision.

3. When it is determined that a case of ulcerative keratitis is not healing promptly with the usual treatment, the sooner delimiting keratotomy is performed, the better the final result that may be expected.

58 East Washington street.

References

- ¹ Gifford, H. Trans. Amer. Acad. Ophth. and Oto-Laryng., 1918, v. 23, p. 418.
- ² Gifford, S. R. Amer. Jour. Ophth., 1922, v. 5, p. 697.
- Ophthalmic therapeutics. Philadelphia, 1932, p. 150.
- Illinois Med. Jour., 1931, v. 5, p. 126.
- ³ Brückner. Klin. Monatsbl. f. Augenh., 1926, v. 77, p. 737.
- Ann. d'Ocul., 1929, v. 166, p. 106.
- ⁴ Sondermann, R. and G. Klin. Monatsbl. f. Augenh., 1932, v. 88, p. 189.

- * Fuchs, A. Brit. Jour. Ophth., 1933, v. 17, p. 193.
- * Sallmann. Ztschr. f. Augenh., 1926, v. 60, p. 284.
- * Pacalin. Arch. d'Opht., 1931, v. 48.
- * Delord. Ann. d'Ocul., 1932, v. 169, p. 379.
- * Hoffmann. Klin. Monatsbl. f. Augenh., 1928, v. 81, p. 508.
- * Blaickner. Ztschr. f. Augenh., 1931, v. 75, p. 285.
- * Weeks. Amer. Jour. Ophth., 1933, v. 16, p. 293.
- * Glimstedt. Acta Ophth., 1932, v. 10, p. 300.
- * Gifford, S. R. (To be published in Archives of Ophthalmology.)

THE ELECTROCAUTERY IN THE TREATMENT OF CORNEAL ULCERS

A. W. MORSE, M.D.
BUTTE, MONTANA

The full value of this treatment is not appreciated because of reluctance to resort to it early, and the lack of exact instruction as to how to use it. This paper, based on practical experience, points out the merit of this procedure. Read before the Pacific Coast Oto-Ophthalmological Society, June 28, 1933.

My object in presenting this short paper is to bring to your attention the fact that the electrocautery is one of the most useful remedies we have in the treatment of corneal ulcers. At the same time, with the proper technic, it is quickly and easily handled, and does not cause the scarring usually attributed to it.

The use of the actual cautery in surgery is very old. In 1873, Martinache¹, a French-American ophthalmologist, who practiced in San Francisco, and was at one time Professor of Ophthalmology and Oto-Laryngology at the University of California, is credited with having suggested and used it in corneal ulcers. Legroux² was the first to use the electrocautery in the treatment of corneal ulcers. Its advantage over the actual cautery was its ease of control and manipulation.

The electrocautery is the most powerful remedy we have. The text books and papers³ dealing with corneal ulcer recommend it, but often as a remedy of last resort; something to be used after all other means have been tried and have failed.

Donovan⁴, in 1903, advised that the electrocautery should be used early in the treatment of corneal ulcer. Our results, obtained from treating a large number of cases in this way, support that contention. Practicing in an industrial community, we see a great many

corneal ulcers. The early use of the electrocautery has given the best results; usually healing takes place in a few days, with almost no scarring. In the more advanced ulcer, it checks the infection, relieves the pain, saves the patient from further loss of vision, and shortens the time of his disability.

The reason stressed against its early use in corneal ulcer is that it causes a denser scar than necessary in healing. This has not been our experience. It is not the cautery, unless used improperly, but the damage from the infection that causes the scar. Knapp⁵ says that he cauterized over one half of the surface of the cornea after the removal of a pterygium, and recovery by repair resulted in almost perfectly transparent tissue without irritation. The same repair occurs in corneal ulcers if they are cauterized early, before the deep corneal tissue is involved. De Schweinitz⁶ says that if the surgeon is careful to touch only those portions involved in the ulcerated process, the resulting scar will not be greater than would have been the case had the ulcer become cicatrized without such treatment.

That the electrocautery has not been used more generally, or with better results, may be due to the fact that a simple, precise method of employing it has not been described in any of the textbooks or papers. It is simple to use, and can be varied to meet almost any

condition. This flexibility is brought about in two ways, by varying the heat of the cautery, and by the method of applying this heat to the ulcer. If the ulcer is small and superficial, the cautery point is used to radiate heat and to sterilize by being brought very close to the ulcer, without making actual contact, as suggested by D. W. Green⁷. For this the point is heated to a cherry red, or even a little beyond into the yellow. On the other hand, when the ulcer is deeper and larger, to make actual contact is the better procedure. Then the cautery point is not made so hot, but is brought to a dull red, or even less, so that there is no color, and it must be tested on a piece of cotton to prove that it is actually hot. The point is brought up to the edge of the ulcer, is actually applied, and quickly withdrawn. This is repeated until the ulcer has been properly cauterized, as suggested by Beard⁸, the points of contact being about two millimeters apart.

One may be confronted with a fairly large ulcer, in which one side is progressive and the other more superficial. In such a case, the progressive part of the ulcer should be touched once or twice, or as often as necessary to sterilize the edge, with the cautery at low heat, penetration to the depth of the infection being desired. For the other side, it is better to make the cautery point hotter, and to bring it close, but not actually in contact with the ulcer, in order to sterilize the more superficial part.

If the ulcer is progressing by undermining almost normal cornea at the edge, the conservative treatment is to cauterize through this superficial normal cornea to reach the advancing infection, for, if the infection is not checked, this cornea is lost anyway. Except in the more severely infected ulcers, cauterizing once usually checks the

ulcer. If, however, after two or three days, there are areas still progressing, the cautery can be used a second time, or as often as necessary. The reaction from the cautery is much less painful than the pain from the infection.

After one has studied the ulcer and has decided how it is to be cauterized, the patient is seated comfortably in a chair with a head rest. Since a local anesthetic is used the patient can open both eyes. He is asked to fix his attention on an object directly in front of him so that he is looking straight ahead, with the ocular muscles relaxed, fixation probably being with the good eye. The cautery is picked up in one hand, as one would a pen. The lids are steadied, or held open, with the fingers of the other hand, and, with the little finger against the patient's head, one brings the cautery point, with the heat regulated for this particular case, slowly and deliberately up to the ulcer, but always so that it can be withdrawn quickly and easily if the patient moves his eye; in fact, if one will go through this procedure two or three times, each time coming a little nearer to the ulcer, it is surprising how any tendency to tenseness is lost, and how accurately one manipulates the cautery exactly as he wishes.

I have frequently tried other means of treating corneal ulcers, such as the various chemical agents, and the thermaphore. In many cases the results were good, but I have invariably come back to the electrocautery as the easiest to use, the most reliable, the most delicate and flexible, and the one causing the least scarring. I am certain that if anyone does not have good results with the electrocautery, or has had bad results, it is because of some error in technic that could easily be corrected.

507 Phoenix Building.

References

- ¹ American Encyclopedia of Ophthalmology, v. 10, p. 7608.
- ² Idem, v. 3, p. 1788.
- ³ Ball. Modern ophthalmology. Ed. 5, F. A. Davis Co., 1926, v. 1, pp. 449 and 454.
- Fuchs, E. Text book of ophthalmology. Ed. 7 (Duane) revised, J. B. Lippincott & Co., 1923, pp. 550 and 557.
- Fox. A practical treatise on ophthalmology. D. Appleton Co., 1920, p. 209.

- Hansell and Sweet. Diseases of the eye. P. Blakiston's Son & Co., 1903, p. 216.
 Gifford. Ocular therapeutics. Lea and Febiger, 1932, p. 150.
 Weeks. Diseases of the eye. Lea and Febiger, 1910, pp. 273 and 278.
 *Donovan. Trans. Amer. Acad. Ophth. and Oto-Laryng., 1903, p. 119.
 *Knapp, H. In Norris and Oliver's "A system of diseases of the eye." J. B. Lippincott & Co., 1898, v. 3, p. 824.
 *deSchweinitz, G. E. Diseases of the eye. Ed. 8, W. B. Saunders & Co., 1916, p. 253.
 *Green. In Wood's "A system of ophthalmic therapeutics." Chicago, Cleveland Press, 1909, p. 81.
 *Beard. Ophthalmic surgery. P. Blakiston's Son & Co., 1910, p. 379.

THE TESTING OF VISUAL ACUITY

II. The comparative merits of test objects and a new type of broken circle as test object

C. E. FERREE, PH.D. AND G. RAND, PH.D.
 BALTIMORE

Three needs or purposes of an acuity object are pointed out: as a standard measure of acuity; as a means for detecting defects in the image formed on the retina; and as an aid in the analysis of these defects. The requirements in a test object to satisfy these needs are stated and discussed. The advantages and disadvantages of the various letter charts, the E chart and the broken circle as test means are outlined and compared. A new type of broken circle is described and its special fitness to satisfy the optimum requirements in a test object is discussed. Attention is given also to the auxiliary condition of a standard, sensitive, and precise test of acuity. From the Research Laboratory of Physiological Optics, Wilmer Ophthalmological Institute, Johns Hopkins Medical School.

In a former paper on the testing of acuity*, differences in coefficient of reflection between test object and background, intensity, composition and color of illumination, and size of pupil were discussed as factors in the sensitive use of the acuity test for the detection and correction of errors of refraction. It is the purpose of the present paper to discuss types of test object, some requirements of a good test object, the comparative merits of the Snellen letters, the letter E and the broken circle as test objects, and a new type of broken circle used with variable illumination as a sensitive test for astigmatism.

Type of Test Object and Some Requirements of a Good Test Object

All have agreed that type of test object is an important factor in the sensitivity of the acuity test and in the correctness of the results obtained. There seems, however, to be a great diversity of opinion as to the comparative merits of test objects and some disagreement

and perhaps some confusion of ideas as to the requirements of a good test object. Although the topic is far from new, a brief analysis and discussion of the points may, it is hoped, still yield some contributive results.

Vision, or the power to see, analyzes into two functions: the formation of the image and the discrimination of the detail in the image. In making the test these functions can not be dealt with in complete separation; however, the test object can be so constructed as to emphasize one or the other. In connection with the formation of the image, we find as defects not only, in general, an incorrect relation between the strength of the refracting system and the distance of the nodal point from the retina but also an asymmetry and irregularity of converging power in the different meridians or planes of the refracting system. And while we have good reason to believe that there is also some irregularity or asymmetry in the discriminative action of the sensorium in the different meridians, it is not near-

*C. E. Ferree and G. Rand. The testing of acuity. I. Factors in the sensitive use of the test for the detection of errors of refraction. Amer. Jour. Ophth., 1934, v. 17, pp. 29-36.

ly so marked as it is in the refracting system, and, in the nonpathologic eye, not so variable from individual to individual. In fact, what little variation there is, leads to space illusions which are characteristic of the plane or meridian in question and are apparently more or less common to all, both in kind and amount. If, therefore, we wish to place the dominant stress on the image-forming function in making our test, we should use a type of object which tests the resolving power of the refracting mechanism simultaneously in an adequate number of planes or meridians. Such test objects as two small dots, small squares and other objects excessively simple as to detail, are not good for this purpose. On the other hand, however, by minimizing the effect of such refractive errors as regular and irregular astigmatism, they are favorable for testing the discriminative power of the sensorium. In this connection it may be noted, too, that if we wish further to minimize the influence of the refracting system on the results of the test, a very small artificial pupil placed as close as possible to the eye will go a long way towards eliminating the influence of the refracting system on the eye's power to discriminate. Refractionists whose purpose it is to test primarily the image-forming function have been wise, therefore, in adhering to the use of test objects having due complexity of detail, in spite of occasional recommendations to the contrary.

At this point, however, we may again note a division of purpose in making the examination. In testing the action of the refracting system, not only must it be ascertained whether or not there is a flaw in the imagery but also a defect, when found, must be analyzed in order to apply the proper correction. The former purpose is best served by great complexity of detail in the test object. In the attempt to analyze the defect, however, too great a complexity is confusing. We are thus forced to select a test object which will serve both purposes in duly balanced proportion or to use two types of test object, one for the preliminary test, suitable for the detec-

tion of a flaw, and the other for the analysis. If both purposes are to be served by the same test object, the task set for the judgment of the patient should, on the one hand, be made as simple as possible, that is, there should be a critical detail; and yet the type of object must be such as to test the resolving power of the refracting system simultaneously in as many meridians as is possible. As will be discussed later in the paper, the broken circle is admirable for this purpose. It is excellent for the initial detection of a flaw and when properly used has, so far as we know, few, if any rivals both in convenience and sensitivity for making the analysis. It is unfortunate that so little use is made of this test object in constructing charts which are distributed by the dealers to American refractionists.

In partial summary of the requirements of a good test object the following points may be noted:

(1) It is desirable that every refraction equipment should be provided with a single well-selected test object, which is either adjustable in size or is furnished in a suitable number of sizes, and which can be rotated when desired throughout 360 degrees. Not only does such a test object, provided with a critical detail which can be presented in different positions as desired, serve every purpose of acuity testing better than a charted series of characters, but its need is imperative in case of the large sizes of test object. Not enough objects of large size can be presented on charts of the type ordinarily used to satisfy even the cruder requirements of a test. The provision of such a test object is practically limited, however, to use of the projection method for securing the test field.

(2) The test object should be of such a form or arrangement of detail as to test the resolving power of the refracting system in a single presentation in an adequate number of meridians. This requirement is not met by such test objects as small dots, small squares, parallel lines running only in one direction, and so forth.

(3) The judgment required should be

in terms of acuity, not recognition. Familiar objects such as the letters of the printed alphabet can be recognized when not seen clearly. The test should be complicated as little as possible by the influence of variable mental factors.

(4) The test should provide an objective check on the judgment. This makes the judgment dependent upon the function that is being tested, namely acuity or clearness of seeing, and minimizes the confusing influence of variable mental factors. It is one of the important reasons for using a test object the critical detail of which can be turned at will in different directions.

(5) For the purpose of analyzing the defective imagery it should be possible to test at will the resolving power of the refractive system in any meridian that is desired. This can be accomplished by providing a test object the critical detail of which can be presented in any meridian. A rotatable test object alone can fully satisfy this requirement. It can be partially satisfied, however, by a chart with test objects the critical details of which are presented in different angular positions.

(6) The test object should set a simple task for the judgment, yet the resolving power of the refracting system should be tested simultaneously in as many meridians as possible. As will be shown later, this requirement is admirably satisfied by the test object which has been adopted as the international standard; namely, the broken circle.

(7) For the purpose of rating vision the test object should be of such type as will satisfy the requirements of a rating or measuring scale. These requirements are: accurate measurability of detail, serial arrangement according to numerical value, adequate fineness of gradation or sufficiency in number of steps or divisions in the scale, equality of steps throughout the scale, and so forth. They are best met by an object having only one critical detail which is easily measurable and can be accurately constructed according to scale. Again attention is called to the broken circle. It can be easily and accurately measured and constructed to scale, and the clear discrimination and correct loca-

tion of its critical detail requires correctness of focusing in all meridians.

(8) If, in a rating scale based on size of object or visual angle, more than one type of test object is used, all that are of the same size should present the same difficulty of discrimination to the eye, at least have the same order of discriminative difficulty. Also they should in relation to the plan of rating neither overestimate nor underestimate acuity. The structural features of many of the letters of the alphabet, for example, are such that they could not be given equal rating in any scale, physically determined, and the greater number of them are given a false rating in the scale employed by Snellen. The letter L occurring in the same line with the broken circle and the letter B, would, for example, by no means set the same task for the discriminative powers of the eye as those objects. In the broken circle, the critical detail, as should be the case in the plan of rating, subtends a solid angle of 1 min. at the eye. In the letter B, only the shorter dimension of the details presented subtends an angle of 1 min. In the letter L, as constructed in one of the charts we have before us, however, the opening between the constituent vertical and horizontal members at its broadest point, which is an important if not the critical detail, subtends an angle of more than 5.5 min. Just what rating the letter L should be given in comparison with the broken circle, the letter B, and the various other letters which are used in the printing of charts would be difficult to decide a priori, but it is not difficult to understand that the results obtained with this letter would relatively greatly overestimate acuity. In 1916, it will be remembered, a Committee on Standardizing Test Cards for Visual Acuity, of which Dr. Edward Jackson was Chairman, published a report in which is given the comparative visibility of all the letters of the alphabet which can be constructed without distortion to meet the 1—5-minute requirement of the Snellen scale. Of the 18 letters used, even when correctly constructed, the same visibility was never assigned to more than two of the group, and the

range of visibility in the group was in the relation of 1 to 0.71. Under such circumstances, no physical rating of the scale can be accepted as measuring visibility, and a proper subjective calibration would require the use of a large number of observers, would be extremely difficult to accomplish, and would at best be somewhat uncertain. Obviously, if ratings are to be made and norms established, the task would be greatly facilitated by adopting a single test object of suitable form or type.

Comparative Merits of the Snellen Letters, the Letter E, and the Broken Circle as Test Objects

The merits of these test objects can perhaps be most conveniently and clearly discussed by noting and comparing their advantages and disadvantages.

The Snellen letters*

Advantages. (1) The series consists of a great variety of test objects simple and complex. When skillfully used, this variety, as already stated, has certain advantages in testing for refractive errors. The series, however, is distinctly a test series, rather than a rating or measuring scale. It was apparently designed for both purposes but it satisfies the latter very poorly. From such a complication of units it is practically impossible to construct a measuring scale that merits the name.

(2) The series is made up of the letters of the alphabet and therefore might be considered as well adapted to testing the eye for the reading of print. However, when one considers how the charts are constructed, even this statement has to be made with grave reservations. In the first place, the series contains only the capital letters of the alphabet. Such letters are of comparatively infrequent occurrence in the printed page. In the second place, some one line in the chart represents for each

eye the critical test. No one line on the chart contains a representative sample of the letters of the alphabet; and the lines having the larger sizes of letter contain only one, two, three, and so forth, letters. For example, in one of the charts which we have at present before us, the first line contains the single letter L, the second T and E, and so on. It is obviously futile to say that such a selection of letters tests the ability to read the printed page or that any selection of letters could be made adequate for this purpose without a great multiplicity of charts and the sufferance of prohibitive fatigue and blurring of vision in making the test. The series then does not even satisfy the requirements of a specific performance test, and it would be regrettable if it did. Obviously, in planning our fundamental test for vision all ideas of fitness for specific performance, however important such performances may be, should be completely abandoned. A most important feature of a test series so fundamental as the Snellen series has come to be, is rating and measurement. To satisfy these requirements, a single standard or unit is imperative, not a multiplicity of objects varying greatly in type and complexity, each one of which constitutes a standard in itself.

Disadvantages. (1) The different letters set a very unequal task for the resolving power of the eye. The angular value of the details which have to be discriminated in letters of the same size (5 min.) may vary in some of the charts that are in common use from 1 to 3 min. or more. Further, there is added a wide range of complication as to form. In the report of the Standardizing Committee previously referred to, of which Dr. Edward Jackson was the Chairman, it was stated that, by empirical determination, the letters used in the Snellen series present a number of well-marked degrees of difficulty of discrimination even when correctly con-

* The term *Snellen letters* is used here roughly to designate all test series comprising a considerable number of the capital letters of the alphabet, constructed to subtend a 5-min. angle at the eye. In the various series that have been used from time to time and in those which are still being used, the construction of the letters in all cases is by no means the same and by no means in all is the 1—5-min. requirement of the Snellen scale met.

structed to meet as nearly as is possible the 1—5-min. requirement of the Snellen scale, yet all the letters in the same line on the chart are given the same value in the unmodified Snellen plan of rating vision. Very excellent recommendations for the improvement of test letter charts and their use were made, it is true, by Dr. Jackson's committee, but unfortunately these recommendations have not been followed as closely as they merit.

(2) The judgment required is in terms of recognition. To be recognized, objects need not be seen clearly. The results obtained are thus not in terms of the function tested and sustain an indeterminate relation to that function.

(3) The series of letters may be memorized as the test proceeds. Objects as familiar as the letters of the alphabet are easily memorized, particularly with the suggestion and aid to recall, afforded even by a poor degree of vision. In case of any fixed series of familiar objects, memory and recognition go a long way towards defeating the purpose of the test.

(4) The gradations in size of letters and in difficulty of discrimination are not fine enough to meet the practical needs of refractive corrections and of rating in the charts that are ordinarily distributed and used. This is particularly true in the upper and lower parts of the scale. It would almost seem that the purpose in the planning of these charts was to give due consideration only to eyes that approximate the Snellen norm or standard. Other types of eye, however, have to be examined and corrected. For example, under a medium or high intensity of illumination it is not infrequent to find young, healthy eyes that can discriminate or can be corrected to discriminate visual angles ranging from $2/3$ to $1/2$ -minute of arc instead of 1 minute, also there are many defective and old eyes that need our best help and consideration. In the charts ordinarily used there is not adequate provision for either of these types of eye. One frequently hears, too, of practitioners who do not even try to obtain a higher acuity than the Snellen norm. Indeed, if good service is ever rendered to eyes rating at either end of

the scale, it is in spite of the possibilities afforded by our commercial charts and the type of practice which they both suggest and compel.

(5) There are not enough letters of the same order of difficulty to give the variety that is needed for repeating the test, without detrimental memorization, as many times as are needed for completing a correction. The same letter, for example, occurs only once in the same line and too few others of the same or approximately the same order of size and complexity of detail. This is more or less a difficulty inherent in any fixed series of test objects, but not nearly so much so in charts made up of a single type of object the critical detail of which is presented in different positions, particularly if an adequate number of positions are used. The only completely satisfactory remedy for this difficulty is, of course, a test object which can be rotated into any position that is wanted at the will of the examiner.

(6) If all the letters of the different sizes are to be used, the completion of the series requires the discrimination of an unduly large number of objects. This causes the eye to become fatigued, and the vision to blur more than is desirable and more than is necessary with a series consisting of a single type of object with the critical detail presented in different positions. Again, a more satisfactory treatment of this situation can be given with a rotatable test object.

(7) The results obtained with the Snellen series of letters present a complicated picture which can be interpreted only by an exceptionally intelligent and experienced refractionist. With reference to the analysis of a refractive defect the series affords little more help than the printed page. Were it not used in practice in connection with a rotatable cylinder, the location of the meridian of an astigmatism would, for example, be practically impossible. The results of the test itself would give little indication of the location of the defect.

(8) The Snellen letters do not satisfactorily meet even the most fundamental requirements of a measuring scale. The construction of a measuring scale presupposes the selection of a unit or

portion of the thing to be measured that is maintained equal in value or magnitude throughout the scale. The Snellen series presents a multiplicity of units—one for each letter that is used in the series. In such a situation, comparison, evaluations, and so on, are difficult and numerical ratings impossible. Can anyone say that the task set by the first line of a chart which contains only the letter L, sustains any known relation to that set by the second line which contains the letters T and E, or to any other line of the chart? In different charts the series consists of 7, 14, 18, 20, and so forth, different letters of the alphabet distributed in various ways in the different lines of the chart. This situation is further complicated by the fact that the number of letters used in the different lines may vary from 1 to 8 or 9. Thus, considering either the individual letters in the line or the line *in toto* as a division in the scale, the situation is hopeless for the purpose of numerical comparison or measurement. The use of such a plan in the construction of scale of physical magnitudes would receive scant consideration and the test letters, as such, are, it will be remembered, physical magnitudes and can be treated as physical magnitudes. Any attempt to treat the lines of letters on the chart as divisions in a subjective scale would require an enormous amount of empirical calibration, an amount that has thus far been found to be prohibitive in any department of sensory work. Considering the test letters as physical magnitudes it is obvious that much greater possibilities for rating and measurement are at our command with the use of a well-selected single object of the sizes that are wanted. In such a case, when all other factors that affect our powers of discrimination are held constant, a fairly good approximation to rating and comparative measurement may be made; also the work of diagnosing and correcting refractive errors would be substantially improved. The above comments become all the more pertinent when it is remembered that a very important use of the Snellen scale is that of a measuring scale for the rating of visual powers. Its use for the analyses

that are needed for the diagnosis and correction of refraction also is limited. It is by no means our wish here to take the attitude of radical reform but it will do no harm to think of these things and to remember that ophthalmology, also the science of measurement, has made great advances since the time of Snellen. It would be comparatively simple, for example, to construct a scale the divisions of which would set tasks for the eye's powers of discrimination as nearly numerically comparable as is possible in our present state of knowledge of the relation of these powers to size of object. All that would be required for such a scale is the selection of a suitable type of test object properly graded and distributed as to size, a standard color and intensity of illumination, standard coefficients of reflection of object and background, and a standard coefficient of gloss or finish for the cardboard or other background on which the test objects are presented, or the equivalent of these in case a projection system is used. For this purpose the broken circle with its opening or openings turned in different directions would be excellent as a test object. For a suitable intensity of illumination it might be suggested that an attempt be made to approximate the standard of lighting practice. However, standards of practice in commercial lighting change greatly from time to time and, moreover, it is difficult at any one time to determine just what the standard is. Again, the aim in commercial lighting is by the use of high intensities, and so forth, to give all eyes good vision; that is, to eliminate as far as possible individual differences. This is hardly suitable for a scale the purpose of which is to rate eyes fairly as to their powers of vision. For this purpose it would seem better to select a medium intensity; for example, 10 ft. c. For the sake of simplicity of specification and of equipment required, the intensity could, without sacrifice of fitness for the purpose, be made the same as is now commonly accepted for perimetry and the study of the visual field; namely, 7 ft. c.

In view of the discussion of principles that has already been given, the advantages and disadvantages of the

letter E and the broken circle can be summarized briefly. In this connection, it will be remembered that in forming the test series in both cases a single object is chosen that has some critical detail, and the variety needed for the series is secured by presenting this detail in different positions. The judgment required of the patient is the correct report of this position.

The letter E*

Advantages. (1) The judgment is simple and not in terms of recognition. In general this test object can be used with great satisfaction both to the patient and the examiner.

(2) With the test object turned in a sufficient number of positions, a satisfactory objective check can be had on the judgment. Also, by selecting the letters in haphazard order in giving the test, and by exercising due care to avoid a repetition of the order, there is little danger from the factor of memorization.

(3) When a sufficient number of positions is used, the results of the test afford directly a great deal of information as to the correctness of the focusing in the different meridians. The test series has therefore considerable analytical as well as general merit.

(4) The letter E, when suitably arranged in positional series, constitutes a more sensitive test than many of the alphabet series for the detection of small differences in acuity and gives a higher reproducibility of results for a given eye. But, as is usually the case with a more sensitive test means or series, it gives a wider scatter of results in a group of normals; that is, it more readily picks up individual differences. The letter E, however, is not as sensitive a test object as the broken circle.

(5) The letter E satisfies fairly well the requirements of a measuring scale. For this purpose, however, it has certain structural disadvantages which will be noted in the following section.

Disadvantages. (1) The letter E does not entirely satisfy the requirement that the resolving power of the eye should be tested in a large number of meridians simultaneously in one presentation. In this respect it is much more selective in its action than the broken circle, the most effective meridian being that at right angles to the parallel bars of the letter. Poor resolving power in the other meridians does not so effectively prevent the patient from being able to tell in which direction the opening is turned as is the case with the broken circle.

(2) The middle bar of the E is too short to meet the requirements for a critical detail in a positional series. The angle to be resolved is 3 min., not 1 min. as is required in the 1—5-min. scale of construction.

(3) The massing of black on one side, due to the backbone of the letter, together with the 3-min. opening on the opposite side enables the patient to tell which way the letter is turned when the three bars can not be discriminated. The tendency thus is to overestimate the acuity of the eye under test.

The international test object—The broken circle

Advantages. (1) This test object has all of the advantages of the letter E and none of its structural disadvantages; that is, there is nothing to indicate which way the opening points but the opening itself.

(2) The task set to the judgment of the patient is ideally simple yet the resolving power in the different meridians is tested remarkably well. That is, when there is an inequality of resolving power in the different meridians, the effect is to give a false location to the opening or to produce the appearance of openings where they are not.

(3) The broken circle, particularly when it is used in connection with a variable illumination as described in our

* The letter E which has been used in the construction of a special test chart for illiterates and children has not, it will be remembered, the construction of the E which conforms to the 1—5-min. requirements of the Snellen scale. It is an E-shaped figure comprising one vertical and three parallel bars, the middle one of which is shorter than the other two. It is this E-shaped figure which is referred to in the above discussion.

former papers, is a most excellent test object for the detection of astigmatism. The combination with variable illumination affords the most sensitive test for astigmatism we have as yet had the opportunity to try.

(4) When used in positional series this test object provides an ideal objective check on the judgment and one that is effective for children, illiterates, and so on.

(5) The broken circle is exceptionally well suited for the construction of a rating scale. There is but one detail to be discriminated, and the form of the letter is such that this can be easily measured and accurately and easily constructed to accord with this scale.

Several years ago, in preparation for testing and devising tests for the effect of lighting conditions on the eye, a comparative study of the merits of test objects was made. Among the number studied were the Snellen letters, the letter E, and the broken circle. Space can not be taken for a presentation of results here. It will be sufficient for our purpose to say that, as tested both by acuity and speed of vision, a much greater sensitivity and a much higher reproducibility of result was obtained with the broken circle than with the other two. In part because of this preliminary study but largely because of the increasingly great satisfaction that it gave, this test object has been used exclusively in all our work on acuity and speed of vision in the study of lighting conditions. For us it is greatly the preferred test object both for laboratory and clinic work. Its adoption as the standard of practice would, we believe, lead to a higher grade of refractive work.

A New Type of Broken Circle and Its Use in Connection with Variable Illumination Testing for Astigmatism

Several years ago* we devised a very sensitive test for astigmatism based on

the use of the broken circle in connection with a variable intensity of illumination. The principle is that the opening in the circle should require the same minimum intensity of illumination for its discrimination, in whatever direction it may be turned, provided that the resolving power of the refracting system is equal in all meridians. If the resolving power is poorer in some one meridian than in the others more light is required for its discrimination in that meridian. Differences in the intensity of illumination required to make the opening visible may then be used as a means of detecting differences in resolving power in the different meridians. Differences in size of opening could be used also for this purpose, but we would have to be able to produce and measure much smaller differences in size than in intensity of illumination in order to detect small differences in resolving power because of the much greater effect of size than intensity of illumination on the visibility of objects.

The illumination scale, being in comparison an amplified scale, is much more sensitive, therefore, for detecting small differences in the resolving power of the refractive system than the visual angle scale. Also changes in illumination can be more easily made in continuous series than changes in size and can be used with equal facility with any type or number of types of test object.

The method which we described for the use of the test is as follows: The amount and axis of the defect is first roughly determined by the customary less sensitive means. With the correction indicated worn by the patient, the opening of the circle is turned in succession into the two critical meridians and the amount of light required for its discrimination determined. If this is not equal, slight changes are made in the axis of the cylinder, corresponding changes being made also in the position of the opening. If this does not render equal the amount of light required to

* Ferree, C. E., and Rand, G. Visual acuity at low illumination and the use of the illumination scale for the detection of small errors in refraction. *Amer. Jour. Ophth.*, 1920, v. 3, pp. 408-417; Sensitivity of the illumination scale for determining exact amount and placement of correction for astigmatism. *Amer. Jour. Ophth.*, 1921, v. 4, pp. 22-27.

discriminate the opening in the two positions, changes are made in the strength of the cylinder and the test procedure is repeated. Since the above papers were published, we have found that the procedure can be shortened to one half by using two openings in the circle with their centers displaced from each other by 90 degrees. The use of this type of circle in no way decreases the sensitivity of the test and has, besides, the technical advantage that the test in both meridians can be made simultaneously. Simultaneous comparisons are always to be preferred to successive comparisons particularly when the test is made in the absence of cycloplegia. Also, as stated above, the test with the two openings can be made in one half the time. A representation of this circle drawn to the 1—5-min. scale is given in figure 1.

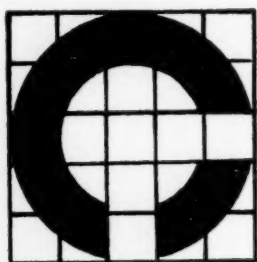


Fig. 1 (Ferree and Rand). The new type of broken-circle test object drawn to the 1—5 min. scale.

We have further found the test to be very sensitive and helpful in making the initial examination for an astigmatism. In performing the test in this way the openings are turned into any two positions that may be desired and the illumination is brought up from a sub-threshold value until one or both of them can be seen as the case may be. If only one is seen, an astigmatism is known to be present. In order to locate the position of poorest imagery, the circle is rotated in either direction until the opening that was not seen becomes visible, first on one side and then on the other of its original position. The position of poorest imagery should be

midway between these two points, and the meridian at right angles to the plane in which the point lies should be the meridian of poorest focusing, since that meridian focuses for that plane. With this indication as to the location of the meridian of the astigmatism and the axis of the correcting cylinder, the test may be completed in the manner described above. In case both openings become visible in the initial positions at the same intensity of illumination, as might happen even if an astigmatism were present, if the positions chosen were midway between the two critical meridians, the circle should be rotated through 360 degrees. If no astigmatism is present, the relative visibility of the two openings should not be observed to change. If it is seen to change, the meridian of lowest visibility or poorest imagery can be located, as indicated above, by noting the positions at which one of the openings disappears and reappears and bisecting the angle or distance between these positions.

Inasmuch as we have found this test for astigmatism to be the most sensitive we have as yet used, we have thought it worth while to attempt to make it feasible as a part of the routine examination. When the test is made with a circle with two openings and by the projection method of producing the test field, this purpose is quite successfully accomplished.

In a later paper a projection apparatus will be briefly described by means of which the test can be readily and quickly made.

The success with which the circle with two openings has been used in this test, indicates that it may be used with corresponding success in the printing of charts. When so used, not only a more sensitive test can be made of the resolving power of the refractive system for any given position of rotation of the circle, but also the openings may be presented in double the number of positions with a given number of positions of the circle.

The Wilmer Institute.

THE LIPIDS OF RETINA, BRAIN, AND BLOOD

P. J. LEINFELDER, M.D., AND P. W. SALIT, PH.D.

IOWA CITY

Quantitative analyses of the retinal lipids in cattle are presented; the results of such analyses are compared with similar ones of the brain and blood of animals. Methods for preparation of materials and for analysis are described with reports on water content, total solids, protein, total lipids, cholesterol, lecithin, cephalin, phospholipids, glycolipids, and iodine number. The lipid content of the retina is less than that of brain, but more than that of blood. Retinal tissue contains more water than either brain or blood, but its protein percentage is lower than that for either blood or brain. The distribution of various lipid substances in whole retina differs greatly from that of brain with which it is often compared, but the various lipids occur in similar percentages of the total fats in the three tissues. The cholesterol value is low in the retina, but there is a greater percentage of lecithin than in the other two tissues. Glycolipids are in equal concentration in the brain and retina. The iodine number of retinal extract is similar to that of brain extract, which suggests a similar rate of metabolism.—From the Department of Ophthalmology, College of Medicine, State University of Iowa.

Quantitative studies of the chemical nature of the retina have not yet been made. Its chemical make-up has been speculated upon and is summed up as follows in the words of Matthews¹: "Very little is known as regards its chemical composition except that it contains myeloid and albuminous matters, substances like cerebrin and phosphatids, and also some collagen and neurokeratin. Its percent of water is high." Qualitative studies of the retina, many of which were made on frogs, were reported in 1879 by Kühne². Lecithin was isolated, and he recognized the presence of lipids, as obtained from an alcohol-ether extract. Some of this work was done by microscopic reactions, by which he showed the presence of collagen, neurokeratin, and myeloid granules.

As a step toward a clearer understanding of the vital processes taking place in the retina, a quantitative analysis was undertaken. In order to make a comparison of values, brain and blood were included in the study.

Experimental

Lipid extraction. All tissues were obtained from yearling cattle; they were removed immediately after death, placed on ice and, within a period of 6 hours, were prepared and extracted. Coagulation of blood was prevented by the addition of sodium oxalate.

Retina. In each experiment the ret-

inas were removed carefully from 50 eyes. They were macerated, weighed, and placed in 300 c.c. of an absolute-alcohol-ether mixture, the proportions of which were 3 parts alcohol and 1 part ether. After standing for approximately 12 hours (over night) the extract was heated to boiling and filtered while hot into a 500-c.c. volumetric flask. The residue was washed repeatedly with the hot alcohol-ether mixture and the volume brought to 500 c.c. Immediately the extract was divided, and determinations on phospholipids, cholesterol, and iodine number were made at once.

For the phospholipids three determinations were run simultaneously, each requiring 5 c.c. of the extract. A similar number of determinations was made on cholesterol, using 5 c.c. for each experiment. Two 50-c.c. portions were used for the iodine number. The remaining extract was utilized for total lipids.

Brain. Twenty-five grams of fresh brain tissue, containing approximately equal portions of the white and gray matters, were macerated and extracted as described above for retina. The extract was divided as follows: For phospholipids 5 c.c. were added to 20 c.c. of the absolute-alcohol-ether mixture, and with 5-c.c. portions three simultaneous determinations were made. Similarly for cholesterol, 6 c.c. of the extract were made up to 50 c.c. and three portions of 5 c.c. each were used. For the iodine

number, two 50-c.c. portions of the extract were employed. The remainder was used for total lipids.

Blood. Twenty-five cubic centimeters of weighed blood, were pipetted into a flask containing 300 c.c. of the absolute-alcohol-ether mixture and extracted as for retina. The extract was divided into three portions of 5 c.c. each for phospholipid determination. Three portions of 6 c.c. each were used for cholesterol. The iodine number required two 50-c.c. portions, and the remainder was utilized for total lipids.

Water. Twenty-five grams of each of the tissues were weighed in a tared evaporating dish; they were then dried at 90° in an oven until they remained at constant weight. The loss in weight represented the water content.

Solids. The weight of the residue after drying represented the total solid matter.

Protein. The solid matter was pulverized thoroughly in a mortar, 0.3 gm. was placed in a 250-c.c. Florence flask, and digested according to the Salit modification of the micro-Kjeldal method³.

Concentrated sulphuric acid (5 c.c.) and perchloric acid (2 c.c.) were added to the powder in the Florence flask; a few glass beads were introduced, and complete digestion was carried out over a microburner. The digest was transferred to a 100-c.c. volumetric flask and the digestion flask was washed repeatedly with distilled water. The solution in the volumetric flask was then made up to volume. The distilling apparatus consisted of a 250-c.c. pyrex Florence flask, a Kjeldal head, and a one-half inch condensing tube which dipped into a test tube (1¼" x 8") containing 10 c.c. of N/20 sulphuric acid. The test tube was immersed in an ice bath. With everything in readiness, 10 c.c. of the diluted digest, 25 c.c. of distilled water, a drop of methyl red, and a few glass beads were placed in the distilling flask. To this was added a predetermined amount of concentrated sodium hydroxide; that is, an amount just sufficient to neutralize the sulphuric acid. The flask was immediately con-

nected to the remainder of the apparatus, and shaken until the indicator turned yellow. Distillation was carried out until all the liquid had passed over into the test tube. Titration was then carried out with N/20 sodium hydroxide.

Calculation: 10 — titre of sample
 $\times 0.7 = \text{mg. N in specimen}$
 $\text{mg. N} \times \text{factor } 6.25 = \text{mg. protein.}$

The approximate protein content was also determined by weighing the dried residue from the lipid extraction.

Phospholipids. A portion of the extract (see Lipid extraction) was evaporated to dryness and 2 c.c. of concentrated sulphuric acid, 1 c.c. of perchloric acid, and a few glass beads were added. This was digested over the microburner and the determination of phosphorus was made according to the method of Whitehorn⁴.

Cholesterol. The required amount of extract (see Lipid extraction) was placed in a test tube, evaporate to dryness, and the cholesterol estimated according to Bloor's⁵ method.

Iodine number⁶. Another portion of the extract (50 c.c.) was evaporated just to dryness, washed three times with 10-c.c. portions of chloroform, and filtered into a 250-c.c. Erlenmeyer flask. The chloroform solution was evaporated just to dryness, and 1 c.c. of chloroform and 2 c.c. of Hanus iodine solution were added. Into a control flask a similar amount of chloroform and Hanus iodine solution was placed. Both flasks were set in the dark for one hour, after which 50 c.c. of water and approximately 0.5 gm. of potassium iodide were added to each; titration was then carried out with N/20 sodium thio-sulphate.

Calculation: $\frac{2.64}{\text{Titre of control}} \times \frac{\text{Titration difference}}{\text{Weight of lipid}} = \text{Iodine number}$

The weight of the lipid used was determined from the total lipids.

Total Lipids. The remainder of the extract was evaporated in a tared flask, dried over night *in vacuo* in a desiccator and weighed.

Kephalin. The total lipids were extracted with ether and the residue was collected in a previously weighed 50-c.c. centrifuge tube. After drying this residue *in vacuo* it was weighed and set aside for glycolipid determination. The ether-soluble portion was placed in a flask and the kephalin was precipitated by the addition of three times the volume of absolute alcohol, collected in a weighed 50-c.c. centrifuge tube, dried, and weighed.

Lecithin. The supernatant liquor from the kephalin was precipitated in a tared 50-c.c. centrifuge tube by the addition of a saturated solution of cad-

Discussion

In table 1 the comparative values of all substances included in this study are listed. The figures which represent percentages of the fresh tissue are averages compiled from three complete analyses of retina and duplicate determinations on brain and blood. An almost total dissimilarity is noted, except in the case of cholesterol and glycolipids, where there is an approximate agreement between retina and blood. The water content of the retina is considerably higher than either blood or brain; this may be partially due to the difficulty encountered in obtaining retinal tissue absolutely

Table 1
PERCENTAGES OF WET WEIGHT

	Retina	Brain	Blood
Water	89.0	78.0	79.0
Solids	11.0	22.0	21.0
Protein	6.0	10.0	15.0
Total lipids	3.4	11.4	1.0
Ether-soluble lipids	2.9	9.25	0.61
Kephalin	0.38	1.89	tr.
Cholesterol	0.22	1.9	0.17
Lecithin	0.93	2.1	0.18
Phospholipids	1.1	5.0	0.34
*Fat ("unidentified" lipids)	1.4	3.59	0.27
Glycolipids	0.2	0.66	0.28
Residue	0.3	1.5	0.11
Iodin number	22.9	24.2	13.4

* Ether-soluble lipids minus lecithin, kephalin, and cholesterol.

mium chloride in alcohol. The precipitate of lecithin cadmium chloride was dried and weighed. Lecithin is determined by multiplication of the lecithin cadmium chloride weight in grams by

the factor $\frac{809}{1028}$.*

Glycolipids. The ether-insoluble fraction of the original extract was washed with hot 95-percent alcohol and centrifuged; the supernatant fluid was decanted and the residue dried and weighed. The loss in weight represented the alcohol-soluble glycolipids. The recognition of the glycolipids depends upon their hydrolysis with nitric acid and the conversion of the galactose into mucic acid crystals.

*809 molecular weight of lecithin, 1028 molecular weight of lecithin cadmium chloride.

free from traces of vitreous. It is improbable, however, that the ten-percent difference between retina and the other two tissues is due to water from adherent vitreous. The remainder of the data in this table does not allow an accurate comparative analysis, on account of the indefinite state of our knowledge concerning lipids. It is evident however that the brain is much richer in lipids than is either the blood or the retina. This is also illustrated by the greasy texture of the dried brain substance, whereas blood is entirely dry, and retina is only slightly greasy.

On the basis of total lipids, table 2 shows the relative percentages of each of the lipids in the extract. It is noteworthy that the wide variations apparent in table 1 are no longer present, but that the various lipids appear to be rather uniformly distributed. The con-

centration of cholesterol in the retinal extract is much less than in either blood or brain, yet gram for gram of whole substance (table 1), retina and blood contain approximately equal amounts of this sterol.

reached concerning their composition, however they probably contain neutral fats, fatty acids, and other decomposition products of the more complex lipids. Such decomposition is well illustrated by the behavior of kephalin.

Table 2

PERCENTAGES OF LIPIDS

	Retina	Brain	Blood
Ether-soluble lipids	85.2	81.0	61.0
Kephalin	11.2	16.6	tr.
Lecithin	27.4	18.4	18.0
Cholesterol	6.5	16.7	17.0
Phospholipids	32.4	44.0	34.0
Fat ("unidentified" lipids)	41.0	31.5	27.0
Glycolipids	5.9	5.8	28.0
Residue	8.8	13.1	11.0

Kephalin, an unstable autoxidizable phospholipid, is a thromboplastic substance and, as would be expected, is practically absent in blood. Its concentration in the retina, on the basis of tables 1 and 2, is not as great as in the brain; especially in table 1 is there an indication of less active metabolism in the retina.

Lecithin forms a greater percentage of the total lipids of the retina than it does of brain or blood. On the other hand, the amount on the basis of whole retina is less than half that of the brain. In spite of the preponderance of phospholipids in whole brain (table 1) the relative amounts in the extracts (table 2) are all high. The discrepancy between the kephalin-plus-lecithin value and the phospholipids is undoubtedly due to the necessary inaccuracy resulting not only from the calculation of phospholipids on a basis of phosphorus determination, but also from the fact that gravimetric determinations of kephalin and lecithin are only approximate. The kephalin and lecithin are not obtained in a pure state, since it is exceedingly difficult to isolate them quantitatively.

The question of the unidentified lipids is interesting. These substances form a high percentage of the lipids in each of the three tissues, however brain is much richer in them than is retina or blood. No conclusions have been

This substance is readily soluble in ether but, after filtration and evaporation of such a solution an ether-insoluble residue remains, showing a change in the original kephalin.

The glycolipids occur in greater concentration in the white matter of the brain, consequently they are believed to be present in the medullary sheaths of the nerves. The retina is normally without medullated nerve fibers, yet the percentage of glycolipids, in the total lipid content of the retina, is equal to that of brain. Their concentration in blood far exceeds that in either retina or brain; this may be attributed to the low lipid content and to the presence of sugar in blood. It is interesting to note that whole blood and whole retina contain similar amounts of this substance. The figure obtained for brain is lower than that given by Koch⁷, furthermore it is lower than that given by Thudichum⁸ for white matter of the brain, but it is higher than his value for gray matter. Tissue variations, as well as the fact that an equal portion of white and gray matters may not have been obtained from the brain, may explain this discrepancy. The other constituents for blood and brain are comparable to those ordinarily obtained.

The iodine number indicates the number of double-bond carbon atoms, or in other words the degree of unsaturation of the fat. The degree of unsaturation

should denote the reactivity of the tissue, consequently an active tissue would have a higher iodine number. In order to reduce, as far as possible, the effects of oxidation, all determinations were made immediately after extraction of the lipids. Brain has the highest iodine number, retina slightly lower, and blood the lowest. The variation between brain and retina is slight, hence a high rate of activity similar to that of the brain is to be expected.

The residue, which is insoluble in alcohol and ether, has not been identified. It perhaps contains hydrolysis and oxidation products of the lipids, salts, carbohydrates, and organic acids.

The percentage composition of all the solids is listed in table 3. It is noted that the blood is low in lipids and high in protein, whereas brain and retina contain approximately equal amounts. This

terminated first. Furthermore the lipids were kept in solution as far as was possible.

Summary

The percentage composition of the principal organic constituents of the retina, blood, and brain is given. The water content of retina is 10 percent higher than either blood or brain. On the wet basis the proteins vary considerably, with retina 6 percent, brain 10 percent, and blood 15 percent. The total lipid content, on a basis of wet weight, is 11.4 percent in brain, 3.4 percent in retina, and 1.0 percent in blood; i.e., it is much higher in brain than in retina or blood. The composition of the lipids is fairly uniform in the three tissues. Lecithin constitutes a greater part of the total lipids of the retina (27 percent) than it does of blood or brain (18 percent each). Cholesterol forms only

Table 3

PERCENTAGE OF SOLIDS

	Retina	Brain	Blood
Protein	54.5	45.5	71.5
Total lipids	31.0	51.8	4.8
Ether-soluble lipids	26.4	42.0	3.0
Kephalin	3.5	8.6	tr.
Lecithin	8.4	9.5	0.85
Cholesterol	2.0	8.7	0.86
Phospholipids	10.0	22.7	1.7
Fat ("unidentified" lipids)	12.7	16.3	1.3
Glycolipids	1.8	3.0	1.33
Residue	2.7	6.8	0.52

table illustrates the high lipid content of the brain and the low lipid content of blood. There is little correlation between brain and retina.

The figures presented are averages, from which rather great variations occur in different specimens of tissue. Variations also depend upon the length of time between death of the animal and extraction, upon the age of the extract, and upon the care exerted in drying the various extracts. These substances are not stable, consequently it is necessary that all experimental work be done as rapidly as possible. A period of two-to-three days was required to complete an analysis, and those substances which were considered most reactive were de-

6.5 percent of the retinal lipids, whereas in brain and blood the figures are approximately 17 percent. There is only a trace of kephalin in the blood lipids, however retina contains 11.2 percent and brain 16.6 percent. The glycolipid fraction of retinal and brain lipids is practically the same (5.8 percent), while it constitutes 28 percent of the blood lipids. The "unidentified" fats form a large percentage of the lipids, 41 percent in retina, 31.5 percent in brain, and 27 percent in blood. The iodine number for retina (22.9) is practically the same as that for brain (24.2) whereas the number for blood is considerably lower (13.4).

References

- ¹ Matthews, A. P. *Physiological chemistry*, Ed. 4, Wm. Wood and Company, New York, 1925, p. 718.
- ² Kühne, W. *Chemische Vorgänge in der Retina*. In "Handbuch der Physiologie" by Hermann. 1879, v. 3, pp. 235-297.
- ³ Salit, P. W. *Chemical studies on eye fluids*. M. S. thesis, Graduate College, University of Iowa, 1927.
- ⁴ Whitehorn, J. C. A method for determination of lipid phosphorus in blood and plasma. *Jour. Biol. Chem.*, 1924, v. 62, pp. 133-138.
- ⁵ Bloor, W. R. The determination of cholesterol in blood. *Jour. Biol. Chem.*, 1916, v. 24, pp. 227-231.
- ⁶ Gibson, and Howard. *Metabolic studies in pernicious anaemia*. *Arch. Int. Med.*, 1923, v. 32, pp. 1-16.
- ⁷ Koch, W. Die Bedeutung der Phospholipide (Lecithane) für die lebende Zelle. *Ztschr. f. phys. Chem.*, 1909, v. 63, pp. 432-442.
- ⁸ Thudichum. Quoted by Matthews, *Physiological chemistry*, Ed. 4, Wm. Wood and Company, New York, 1925, p. 601.

AN OPHTHALMOLOGICAL SURVEY OF ILLINOIS STATE SCHOOL FOR THE BLIND

A. L. ADAMS, M.D.
JACKSONVILLE, ILLINOIS

R. C. GAMBLE, M.D., S. R. GIFFORD, M.D., AND H. S. GRADLE, M.D.
CHICAGO

This survey of 238 inmates of a state school for the blind showed that 7.5 percent of the children had 20/70 sight or better in the best eye, 17.2 percent had 20/70 to 20/200, and 75.3 percent had less than 20/200. Thus 24.7 percent could be given public-school or sight-saving-class instruction. Sixty-four were recommended for operation and 81 for proper refraction and glasses, with a view to possible further additions to classes not receiving blind education. Recommendations with regard to admission and treatment after admission to the School for the Blind were made.

The great importance of having a uniform and satisfactory definition of blindness and of having proper admission requirements for our schools for the blind is clearly shown by the results of a survey made of all the children in residence at the Jacksonville school in April, 1933. The survey was made at the request of the Board of Public Welfare of the State of Illinois. Inasmuch as these children were in a school for the blind and not inmates of a blind asylum, the educational aspects and the possibilities of visual improvement by medical or surgical means were uppermost in our minds. In each instance it was determined whether the child should be in a blind class, sight-saving class, or in regular school, and in cases where treatment offered some hope of visual improvement, we estimated as accurately as possible which type of instruction should be given, although the final decision, of course, would have to be made after the results of the treatment had been obtained.

Each child was examined, the history on file at the school was noted, the vision recorded, both with and without glasses, the eyes were examined for external diseases and also for fundus conditions, a diagnosis was made, and suggestions as to treatment were made, if there was any possibility of improving the condition. All of the questionable cases were seen in conference by all of the examiners.

The total number examined was 238. The appended table A gives the amount of vision found, and a summary of that table shows that:

The number of children with vision in the best eye of 20/70 or better was 18 or 7.5 percent.

The number of children with vision in the best eye of between 20/70 and 20/200 was 41 or 17.2 percent.

The number of children with vision in the best eye of less than 20/200 was 179 or 75.3 percent.

The children of the first class should be returned to public school without further argument. The children of the

second class should be removed from blind education and put into sight-saving classes. The children of the third class belong in a blind school. In other words, 24.7 percent (or 59 in all) of the children instructed by blind methods belonged in sighted classes.

In the appended table B is a classification of the eye conditions according to the diseases found. This is of technical interest rather than practical value, but it leads to the appended table C in which are to be found the recommendations based upon the examinations. Part I of this table contains the recommendations for remedial surgical measures advised. Sixty-four of the children or 26.9 percent could be bettered from the visual standpoint by corrective surgical measures. This does not mean that the entire number of 64 could be returned to the sighted world, as it is impossible to estimate the amount of final vision. However, these children should be given the benefits of modern surgery to improve the visual condition when possible, and it is certain that many of them could be returned to sight-saving classes. Part II of table C shows the number of cases in which improvement of vision could be obtained by proper refracting and fitting with glasses. Whether the improvement would be sufficient to return these children to the sighted world and remove them from blind education cannot be foretold, but certain it is that they should have the benefit of whatever sight is possible in each individual case. These children number eighty-one of the entire School or 34 percent.

From a study of these figures, several facts become apparent. First, 24.7 percent of the children in the School should not be receiving blind education because the amount of vision present in these cases is enough to justify being in public school or sight-saving classes. Their presence in Jacksonville is due to three factors:

- A. Laxity in the medical examination before admission to the school,
- B. Lack of authority for the attending ophthalmologist to discharge such pupils whose vision is too good for blind education, and

C. Lack of sight-saving classes outside of the larger communities.

Second, 26.9 percent of the children bear the possibility of having their vision improved sufficiently by surgical means to remove them from blind education and restore them to the sighted world. This indicates (a) Lack of proper ophthalmological attention before admission to the School, and (b) Lack of authority on the part of the attending ophthalmologist to remedy such conditions after the children have been admitted.

Third, 34 percent of the children bear the possibility of having their vision improved sufficiently by the proper fitting of glasses to remove them from blind education and restore them to the sighted world. This indicates (a) Lack of proper ophthalmological examination before admission to the School, and (b) Lack of authority for fitting glasses and lack of finances for furnishing glasses within the School.

In view of these facts, we submitted the following recommendations:

1. The establishment of model sight-saving classes in the School for the Blind at Jacksonville, with the understanding that admission to such classes is open only to children whose homes are not within available distance of established sight-saving classes.
2. Blind children and sighted children may be fed and housed together as at present, but should have separate instruction rooms and methods.
3. The visual requirements for admission to the School should be (a) For Blind Instruction: Vision of less than 20/200 in the best eye with correcting glasses; (b) For Sight-Saving Classes: Vision between 20/70 and 20/200 in the best eye with correcting glasses.
4. One of the requirements for admission to the School should be a certificate of a physician licensed to practice in Illinois and registered in the Section of Ophthalmology of the Illinois State Medical Society, stating the diagnosis and condition of each eye and the vision, with and without correcting glasses.
5. The attending ophthalmologist of

the School should be empowered to refuse admission to new applicants whose vision exceeds the limits defined in Section 3. This calls for an examination of all new applicants immediately upon admission.

6. A systematic examination of the entire Blind School population should be made every three years, preferably by a committee of three ophthalmologists.

The remaining recommendations dealt solely with local conditions and are of no general interest.

Thanks to the active interest of the Governor of the State and the active cooperation of the Board of Public Welfare, these recommendations are being carried out. In this way, the blind population of the School has been reduced to those actually requiring blind education and at the same time, visual education has been made possible for the visually handicapped by the establishment of the sight-saving classes available for such children who live in districts that have no such classes.

We believe that this survey has resulted in two benefits:

1. A financial saving to the State of many thousands of dollars per year, and

2. The visual education of many children who in the past would have received their education in the School for the Blind by blind methods or else would have attended public school without sight-saving classes and would have been severely handicapped by their visual weakness.

Table A

CLASSIFICATION ACCORDING TO VISION

Both eyes totally blind	49
One eye totally blind	43
Best eye has light perception	45
Best eye discriminates shadows	15
Best eye counts fingers	23
Best eye 1/200 to 20/200	47
Best eye 20/200 to 20/70	41
Best eye 20/70 to 20/30	13
Best eye 20/30 or better	5

Table B

CLASSIFICATION ACCORDING TO DISEASE

Staphyloma	10
Optic atrophy	
Meningitis	2
Hereditary	1
Undetermined	29
Accidents	
Perforating injuries	10
Sympathetic ophthalmia	9
Glaucoma	
Primary	3
Secondary	14
Cataracts operable but not operated on ..	7
Cataract	34
Cataract with microphthalmos	11
Microphthalmos	9
Choroiditis	6
Corneal opacity	21
Interstitial keratitis	8
Phthisis bulbi	14
Enucleated both eyeballs	10
Cerebral blindness	3
Retinitis pigmentosa	7
Conical cornea	1
Retinitis proliferans and vitreous hemorrhage	2
Retinal degeneration	8
Xerosis of cornea	1
Definitely due to ophthalmia neonatorum	27
Astigmatism	4
Myopia	12
Hyperopia	5
Albinism	5
Trachoma	2
Aniridia	2
Keratoconus	1

Table C

SUMMARY OF TREATMENT ADVISED

Part I

Trephining	3
Iridectomy	14
Iridectomy and lens extraction	4
Enucleation	4
Capsulotomy	1
Needling	34
Iridotomy	1
Diathermy peritomy	1
Chalazion removal	1
Stripping cornea and graft	1
	64

Part II

Refraction	69
Telescopic Lenses	11
Contact Glass	1
	81

EXPERIMENTAL PRODUCTION OF DETACHMENT OF THE RETINA

HERMAN WEISS, M.D.

AND

JOHN N. EVANS, M.D.

BROOKLYN

Placing of a tight ligature about the optic nerve produced edema of the nerve head, peripapillary detachment of the retina and in some cases balloon-like detachments. From the research department of the Brooklyn Eye and Ear Hospital.

In the Spring of 1933, we attempted experimentally to reproduce variations in ocular tension in accordance with the theory suggested by Salzmann¹ that a certain type of obstruction to the return flow through the central vein was responsible for some of the phenomena in glaucoma. Accordingly, as a preliminary step, we attempted to place ligatures around the optic nerves in rabbits' eyes to simulate conditions postulated by this theory. The ensuing events were so bizarre and so different from anticipated results, that we hasten to record them as they occurred, insofar as they might possibly offer new material for speculation as to the pathogenesis of such conditions as detachment of the retina, choked disk and retinal edema. The fact that the same procedure was carried out with similar results in a patient whose eye was enucleated for sarcoma of the choroid, makes more intimate the relation of this experimental data to the clinical picture. Approximately thirty rabbits were used. A detailed record was kept of seventeen rabbits. Both eyes were carefully examined for disease or anomaly, one eye being reserved as a control while the other served for experimentation. The following summarized protocol will serve to illustrate the technic:

On August 22, 1933, a rabbit was injected intraperitoneally with 2 cc. of a mixture containing 70 percent ether, 30 percent albolene, and 10 gms. of chlore-tone to 100 cc. of this mixture. Deep anesthesia developed in 20 minutes. The lids were then separated with the fingers and a suture was passed through the superior oblique muscle which served for traction. Openings were then made in the conjunctival fornix and in Tenon's capsule above. An aneurysm needle threaded with 18 lb. test braided Japanese silk fishing line was passed

through the openings so as to carry the ligature around the posterior third of the globe in the form of a loop, the ends of which ultimately protruded through the original conjunctival incision. The large venous sinus back of the globe was slightly injured during manipulation but the bleeding quickly ceased. The eyegrounds were then examined, there being no apparent difference between the two eyes. The vessels and margins were normal. The margins of the nerve head were seen with a -2 sphere. The nerve was then compressed with a single tie and without much pressure. (We assumed that this ligature included the optic nerve and its immediately adjacent structures—later this was verified by histologic studies.) There was an almost instantaneous change in the appearance of the papilla. The lower margin assumed a shelf-like appearance, protruding directly out into the vitreous. At the end of the first minute, the dome of this shelf was seen with a plus 5 sphere. This apparently was a peripapillary detachment of the retina involving first the lower margin of the nerve head and then gradually extending around either side. The suture was then drawn tighter and there was a rapid production of edema which completely obscured all the margins of the nerve head. The detachment then apparently increased in height and area until the dome was seen with a plus 12 sphere. The animal died about two hours after the operation and the eye was removed for histologic study.

There were certain modifications of the above procedure. These were:

1. Use of #3 surgical black silk for ligation of the nerve when it was desired to produce the "shelf" like detachment involving the lower peripapillary area.

2. Use of 18 lb. test braided, Japan-

ese silk fishing line to produce widespread retinal detachment.

3. Passing the suture around the nerve was sometimes performed by multiple punctures of the conjunctiva and repeated rethreading of the aneurysm needle, while at other times it was possible to pass the suture entirely about the nerve and withdraw it from the same conjunctival opening through which it had entered.

4. When it was desired to maintain pressure about the nerve temporarily, the standard snare for enucleation was used—the wire however being replaced

pression of numerous ophthalmologists to whom we have demonstrated the phenomena, that the various stages of this picture can be interpreted as (1) edema of the nerve head, and (2) of the adjacent retina; (3) peripapillary detachment of the retina; (4) spreading of edema and detachment mostly below and in the retinal vessel streak; (5) complete balloon detachment of the retina which involved in its last stages all the retina.

Note: In our series of rabbits, we were able to produce this complete ballooning in only four instances. Albino rabbits seemed decidedly the best subjects.



Fig. 1. (Weiss and Evans). The above photomicrograph is from one of our preparations in which the ophthalmoscopic picture was that of an extensive "balloon detachment." The fluid beneath the retinal folds appears to be a transudate.

by the above silk. After the suture had been on the required length of time, the pressure of the snare was released. This permitted the retina to reassume gradually its normal position, (at times in twenty minutes).

5. In order to study the effects of ligation over varying periods of time, we terminated the animals or released the ligature at intervals varying from a few minutes to several weeks. The optimum time seemed to be in the neighborhood on one hour.

It is our impression from our ophthalmoscopic studies, and also the im-

The question naturally arose as to the nature of the fluid beneath the detachment. The most obvious answer to this question was to collect some of the fluid. This was done in one case of marked ballooning and found to be a clear, watery fluid which did not coagulate on standing, and which contained no floculi. It did however produce flocculation on boiling. More elaborate studies of this fluid are under way.

The next question of importance was to determine by histologic study whether the picture had its origin in a detachment or in simple edema of the retina. In this we encountered more difficulty than we expected because of unsatisfactory fixation, as the fluid was apparently extracted in the hardening process. Various forms of fixation are being studied at this time and a report on histologic findings is reserved for a later note.

This note is submitted at this time because of the interest in surgical treatment of retinal detachment, the fact that the technic is applicable to human eyes about to be enucleated for various reasons, and the hope that application of the method herein outlined—both in the laboratory animal and in the human eye—will aid in an understanding of the mechanism of similar clinical pictures and in the adaption of therapeutic measures for their control.

Reference

- ¹ Salzmann, Prof. Dr. Maximilian. Glaucoma and retinal circulation. (Abhandlungen aus der Augenheilkunde und Ihren Grenzgebieten. Edited by C. Behr and J. Meller, Hamburg and Vienna. Part 15. (monograph).

PARINAUD'S CONJUNCTIVITIS

CLYDE E. HARNER, M.D.
LONG BEACH, CALIFORNIA

An eye infection presenting all the characteristics of Parinaud's conjunctivitis in which the *Leptothrix* of Verhoeff was successfully demonstrated seems to establish this disease as a definite clinical entity. It appears well established that the mode of infection of the patient was from caring for a pet cat which had developed lesions of the paws, face, and eyes following the devouring of ground squirrels in the mountains of Southern California. Tests of the patient were negative for tularemia and tuberculosis. Excision of the main infected follicle together with the use of electro-desiccation and silver nitrate is an adequate treatment and in this instance prophylactic against gland suppuration. The technic for demonstrating the *Leptotriches* is extremely delicate and follows the outline of Lemoine⁹ in which is used the modified Gram stain of Verhoeff.

The clinical syndrome of enlarged lymph follicles of the conjunctiva, progressing to necrosis and accompanied by inflammatory enlargement of the preauricular, submaxillary, and cervical lymph nodes, with constitutional symptoms, has been known as Parinaud's conjunctivitis since he described it in 1889¹.

There has been much diversity of opinion as to whether or not this is a definite clinical entity. Many excellent ophthalmologists assert that it is not. Rolandi² regards it as a type of ocular tuberculosis. Von Herrenschwand and Bayer³ report finding an organism, *Bacillus pseudotuberculosis rodentium*, in rodents, which caused a conjunctivitis of this type.

Vail (senior and junior)⁴, and Francis⁵ described cases of severe conjunctivitis accompanied by the above symptoms, which were definitely due to the *Bacterium tularense*. Squirrel-plague conjunctivitis and the Conjunctivitis necrotans infectosa of Pascheff⁶ are quoted by some authorities as being caused by the same organism as Parinaud's conjunctivitis and are considered as only varieties of the same.

In 1904, Verhoeff and Derby⁷ described the histopathologic findings in Parinaud's conjunctivitis, and in 1913, Verhoeff⁸ demonstrated an organism, classified as a *Leptothrix*, which he proved to his satisfaction was the cause of the disease. Wherry and Ray⁹ in 1918 cultivated a *Leptothrix* from the preauricular gland in a case presenting this clinical syndrome. In 1924, Lemoine⁹ was able to demonstrate this organism in the necrotic areas of enlarged folli-

cles from the conjunctiva of a woman thus infected, using the Verhoeff modified Gram stain. He stressed the delicacy of the technic required. Sanford Gifford¹⁰ reported finding the organism in 1927. In 1933, Verhoeff and King¹¹ reported the artificial cultivation of the *Leptotriches* in three or four cases.

Perhaps the majority of observers¹² and particularly Verhoeff are inclined to regard it as certain that the infection is not derived from diseased animals, as Parinaud assumed.

A case of Parinaud's conjunctivitis recently seen by me, in which the *Leptothrix* of Verhoeff was identified, gives a very definite history of contamination with a sick cat which had fed upon ground squirrels in the mountains of Southern California, and in this case there was no agglutination of *Bacterium tularense* with the patient's blood serum, and the patient was not tuberculous.

Case Report. Miss H. L., aged 41 years, a school teacher who had been seen for ophthalmic care (refraction) three years before, presented herself September 6, 1933, with the complaint that for about a week her right eye had been "uncomfortable and irritated," involving mostly the lower lid, but there was also swelling of the upper lid.

Upon close questioning the history was obtained that about a month before, she spent a week in the San Bernardino Mountains, vacationing, and took with her her cat. While there the cat developed a dry-scale condition of the paws and eyes. Investigating, they found the cat was occasionally catching and devouring ground squirrels, parts

of the hides of several animals being found about the cabin. Upon returning to the city a veterinarian diagnosed the condition "mange" and since it did not respond to treatment killed the cat.

The patient had always been healthy, having had measles at nine years, typhoid at fifteen years with no sequelae, and influenza in 1918. The family history was essentially negative except that an elderly family physician had diagnosed the condition from which her father died three years ago as tuberculosis. However, her father died at eighty-one years of age after seven weeks' sickness beginning with influenza, and the diagnosis is open to question. Her mother died at the age of seventy years from heart trouble. She has two sisters living and healthy. There is no other history of tuberculosis.

Examination: The left eye was normal, the right showed moderate edema of both upper and lower lids. There was a marked enlargement of the lymph follicles of the palpebral conjunctiva of the lower lid, much worse toward the outer canthus and fading away toward the caruncle. In the exact center of this lid in the cul-de-sac was a large grayish-red mass with a yellow center, about the size of a large BB shot. There was some stringy, slightly yellow discharge. A smear of this material revealed many pus cells and epithelial debris but no organisms. The upper-lid conjunctiva was hyperemic but there was no hyperplasia of the lymph follicles. The cornea was clear and the bulbar conjunctiva negative except for slight hyperemia. The patient complained of slight discomfort of the throat, but there was apparently no inflammation of the pharynx and she had no tonsils. At this time there was no swelling of the preauricular lymph gland and the condition was assumed to be a simple conjunctivitis. The lymph follicles were lightly touched with five-percent silver nitrate and immediately flushed with salt solution. Hot magnesium-sulphate applications and zinc-sulphate-collyrium instillations were advised. A small sharp knife-needle was inserted into the mass in the center of the conjunctiva but no pus was obtained. The follow-

ing day the patient complained of pain in front of the right ear and under the jaw. It was found that the preauricular and submaxillary lymph nodes were swollen and quite tender. The lymph follicles were much smaller. They were again touched with two-percent silver nitrate. A diagnosis of Parinaud's conjunctivitis was made and scrapings of the conjunctiva were examined after staining with Loeffler's methylene blue. A few extracellular staphylococci were found, but no *Leptothrix*. The urine was examined and was entirely negative except for a few pus cells. The blood count showed: leukocytes 7100; polymorphonuclears 68 percent; lymphocytes 29 percent; eosinophiles 2 percent; basophiles 1 percent. The temperature was 100.4°F. The Wassermann reaction was negative, as was also the Mantoux test for tuberculosis.

On September 15, 1933, the larger mass in the fornix was still about the same size, but the other lymph follicles had almost returned to normal. The temperature was again 100.4°F. The mass was incised and the area lightly exposed to electro-desiccation.

On September 16, the eye was much better and the lymph glands were slightly less swollen and inflamed. The temperature was 99.4°F.

On September 18, the patient stated that on the previous day she had "ached all over as if she had the 'flu'" and that her temperature had been 100.5°, but that her eye had felt more comfortable. Examination revealed the palpebral conjunctiva to be much improved, the follicles having receded practically to normal but the temperature was still 100.2° and the preauricular, submaxillary, and anterior cervical lymph nodes on the right side were more sensitive and swollen. Iced compresses to these, calomel, and saline laxative were ordered. The following day there was great improvement, locally and generally.

The patient was seen at intervals of several days to a week until, and including, October 14, 1933. During this interval the lymph glands were at times much better and occasionally were more tender to pressure, but there was a

gradual decrease in their size. The parotid, preauricular, and anterior cervicals were still palpable when last seen on October 14. There was no tenderness of the parotid and preauricular glands but still tenderness on pressure on the anterior cervical region. In the lower fornix several small elevated follicles remained. The patient has not appeared for further observation since that date.

Pathologic examination

The grayish-red mass with the yellowish center which had been excised was fixed and the sections were stained with the Verhoeff modified Gram stain closely following the technic as outlined by Lemoine⁹.

Tissue was fixed in Zenker's fluid without acetic acid and imbedded in celloidin. The sections were stained in hematoxylin and eosin, Mallory's connective-tissue stain, and Mallory's phosphotungstic acid hematoxylin. Some of the sections were stained lightly in hematoxylin and eosin followed by the Verhoeff modified Gram stain.

There was marked infiltration with a few polymorphonuclear cells and many lymphocytes, large monocytes, and plasma cells. The organisms which were delicate, filamentous, and nonbranching

in appearance were found in fairly dense clumps in the areas of cell necrosis. Occasionally single organisms were found in the surrounding areas.

No attempt was made to culture the organisms since facilities were not available.

Comment. The case presented is one of true Parinaud's conjunctivitis and seems to eliminate any doubt that it is a definite clinical entity. The Leptotrix of Verhoeff was identified and the infection was proved to be neither tuberculous nor due to *Bacterium tularense*. It seems reasonably certain that the organisms were transmitted to the patient through the medium of a cat from infected ground squirrels.

The technic for demonstrating the Leptotriches requires great delicacy and care.

The infected glands began to recede as soon as the large necrotic hyperplastic focus was excised and this procedure in addition to vigorous treatment with silver nitrate would appear to be a satisfactory treatment and a prophylactic against gland suppuration. It takes many weeks before the glands return to normal size.

314 Security Building.

References

- ¹ Parinaud. Recueil d'ophtalmologie, 1889.
- ² Rolandi. Ann di Ottal., 1916, v. 44, p. 33.
- ³ Bayer, G., and von Herrenschwand, F. Arch. f. Ophth., 1918-1919, v. 98, p. 342; also Fuchs's Textbook of Ophthalmology, p. 475.
- ⁴ Vail, D. T. Sr. Bacillus tularense infection of the eye. Ophth. Rec., 1914, v. 23, p. 487.
- ⁵ Vail, D. T. Jr. A case of Bacillus tularense conjunctivitis. Arch. of Ophth., 1926, v. 55, p. 235.
- ⁶ ———. Oculoglandular tularemia. Arch. of Ophth., 1929, Oct., v. 2, p. 416.
- ⁷ Francis, E. Jour. Amer. Med. Assoc., 1925, April 25, v. 84, p. 1243.
- ⁸ Pascheff. Arch. d'Opht., 1921, v. 38, pp. 23 and 83.
- ⁹ Wherry, W. B., and Ray, V. Jour. Inf. Dis., 1918, v. 22, p. 554.
- ¹⁰ Verhoeff, F. H., and Derby, G. S. Parinaud's conjunctivitis. Arch. of Ophth., 1904, v. 33, p. 389.
- ¹¹ Verhoeff, F. H. Parinaud's conjunctivitis: A mycotic disease due to hitherto undescribed filamentous organism. Arch. of Ophth., 1913, v. 42, p. 345.
- ¹² Lemoine, Albert N. Parinaud's conjunctivitis. Jour. Amer. Med. Assoc., 1924, Feb. 16, v. 82, pp. 537 and 538; and Mallory and Wright, Pathological technique, 1911, p. 250.
- ¹³ Gifford, S. R. Amer. Jour. Ophth., 1927, v. 10, p. 484.
- ¹⁴ Verhoeff, F. H., and King, M. J. Leptotrichosis conjunctivae (Parinaud's conjunctivitis). Arch. of Ophth., 1933, May, v. 9, pp. 701-713.
- ¹⁵ Tomassene, Raymond A. Parinaud's conjunctivitis. Amer. Jour. Ophth., 1928, Sept., v. 11, pp. 721-722.
- ¹⁶ Sanyal, Saradindu. An atypical form of Parinaud's conjunctivitis. Indian Jour. Med., 1929, v. 10, pt. 3.
- ¹⁷ Maitra, Jatindra Nath, and Sanyal, Saradindu. Epidemic unilateral conjunctivitis with corneal infiltration and adenitis. Jour. Indian Med., 1932, November.

NOTES, CASES, INSTRUMENTS

IMPROVED ILLITERATE TEST CHART CABINET

JACOB B. FELDMAN, M.D.
PHILADELPHIA

In an effort to obtain more valid tests in visual acuity, it was found that the "E" illiterate chart or the Landolt rings yielded the most accurate results. This is because memory can not play the important part which it does in the ordinary test chart. The illiterate chart is made still more valuable when the letters "E" can be made to take different positions.

The instrument devised for this consists of a transparent linen chart, which

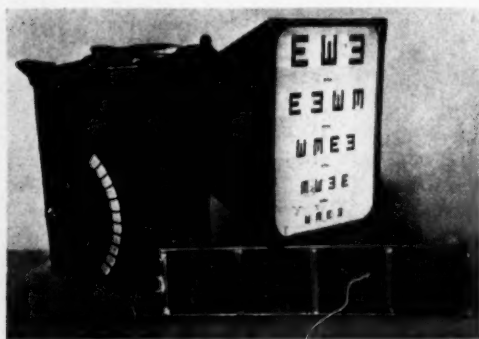


Fig. 1 (Feldman). Improved illiterate test chart cabinet.

can be purchased in the open market, on which are painted the illiterate "E" or the Landolt rings. This chart is pasted between two plates of window glass supported in a movable frame. It may be rotated in steps of 45 degrees so that the individual chart takes the place of eight different charts at the will of the examiner.

The lamp house contains a 100 Watt daylight bulb, behind which is a large diffusing reflector, which serves to illuminate the illiterate chart uniformly. On the outside of the lamp house is a lever which operates the lamp reostat. The illumination on the chart can be varied from 0 to 40 foot candles in eleven separate steps. There is a slot for the insertion of colored filters by

which the letters show black on a colored background of red, blue, yellow and green.

The instrument was constructed very cheaply*, is very easy to operate, and has proved of great service in vision taking and in evaluations of visual acuity at St. Christopher's Hospital for Children, Philadelphia.

707 Physician's Building.

A SPECIAL PRESBYOPIC GLASS

WILLIAM BROWN DOHERTY, M.D.
NEW YORK

While watching one of my rhinologist colleagues who had just reached the presbyopic stage it occurred to me that his labors could be greatly lessened. I had a pair of specialists' bifocal lenses made with the near correction placed in an almost vertical plane (2 mm. in, to allow for convergence); the distant correction being to the right and left of the segments. This position of the segments allows for a free movement of the head in an up and down direction while operating and also enables the surgeon to see to the right or

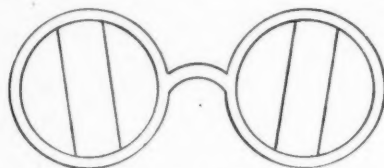


Fig. 1 (Doherty). Special presbyopic lenses.

left while engaged in exchanging instruments.

These lenses are suitable for the ophthalmologist. They are also of special benefit to the presbyopic stenographer who desires to use the middle segment while typewriting and the side vision for her shorthand book which is at a greater distance than the ordinary range used in reading.

150 West 55th Street.

*The cabinet can be purchased from Street, Linder and Propert, manufacturing opticians, Philadelphia. The price is \$50.00.

SUPPORTING SUTURE IN PTOSIS OPERATIONS

ALBERT D. FROST, M.D.
COLUMBUS, OHIO

Perhaps the one thing that causes most hesitation in performing the various types of ptosis operations is the fear of corneal complication. It has been my experience that none of the many suggestions for protecting the cornea has been absolutely satisfactory.

In a series of nine cases operated on in the last few years I have used to my satisfaction a simple procedure with very gratifying results. It offers both a protection to the cornea and a support for the upper lid which might prevent pulling out of sutures, particularly in the Motais operation.

The procedure can best be explained by study of the drawing. One double armed No. 6 twisted silk suture and two strips cut from soft rubber tubing are all that are necessary. It is desirable that small cutting edge needles be used in order not to injure the Meibomian glands in passing through the free border of the lids and while in apposition to the anterior side of the tarsus. After the needles have passed through the upper lid and into the skin incision above, the sutures may be re-threaded in longer and stronger needles to be passed to their exit above the eye brow. Throughout their course the sutures should be beneath the orbicularis oculi fibers. At the level of the supraorbital ridge they should be placed deep enough to obtain some purchase from the epicranial fascia. They are then tied over a rubber strip with any degree of tension desired. This holds the lower lid in apposition to the upper lid. The pressure

dressing and bandage may then be applied with the result that there is lessening of post-operative reaction, added comfort to the patient, and relief of anxiety to the surgeon. The dressing is removed at the fourth or fifth day at which time the sutures may be removed.

The time of application of these sutures may vary in each operator's hands

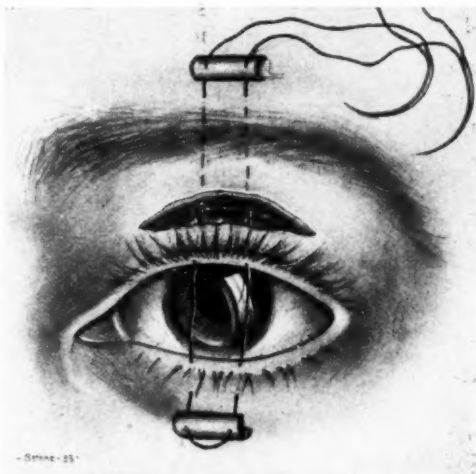


Fig. 1 (Frost). Supporting suture in ptosis operation.

depending upon the type of operation done. The sutures are then left untied until after the final adjustment of the superior rectus sutures, if the Motais technic is used, after which the proper elevation of the lower lid can be done as a final step in the operation. Needless to say the cornea must be watched and protected thereafter by a non-irritating ointment.

Ohio State University, Department
of Ophthalmology.

SOCIETY PROCEEDINGS

Edited by DR. H. ROMMEL HILDRETH

NEW ENGLAND OPHTHALMOLOGICAL SOCIETY

November 21, 1933

Dr. Hugo B. C. Riemer presiding

Herpes zoster

Dr. Trygve Gundersen gave a preliminary report on the treatment of herpes zoster ophthalmicus with convalescent blood. Eight cases with definite involvement of the eye were selected from a group of 30 cases of zoster seen during the past 18 months. Blood was given in the form of blood serum (1 case), whole fibrinated blood (2 cases), and whole blood by transfusion (5 cases). The effect on severe pain in all acute cases had been striking. Likewise, an improvement had been noted in the general physical condition. No immediate improvement had been seen in the uveitis save in one case where the cure was rapid and complete. Two cases still had an active uveitis.

Ocular tuberculosis

Dr. Merrill J. King said that in the Howe Laboratory work was being continued in an endeavor to standardize quantitative intracutaneous technique for diagnosis with tuberculin. Five hundred cases of suspected ocular tuberculosis had been treated, 75 percent of which had reacted to the tuberculin test in dilution of 1-100,000th to 1-40,000th of a millegram. The patients with positive reactions had been divided into two groups, one of which was receiving tuberculin therapy. Dr. King said it was too soon to attempt to evaluate results but with several exceptions the patients had improved, some in a startling manner.

Influence of size of retinal image on binocular vision

Dr. Walter B. Lancaster discussed the size of objects and images as measured by the angles subtended; the monocular perception of space, accurate in two dimensions; the binocular perception of space, dependent on the fact that

the two eyes viewed the field from two points, resulting in differences in the retinal images, the differences being those in size and shape; changes in the sizes of the ocular images producing changes in space perception, for example, in the horopter. He discussed the importance of corresponding retinal points and areas, and of disparate retinal points. Binocular vision, he said, was not a summation of the two monocular sensations, but a synthesis of them, and therefore different from either, though similar to both. In discussing Fechner's paradox, he said that this was not innate and unalterable, but was capable of training and of change. Since differences in size of the ocular images affected space perception so fundamentally, their importance was obvious.

Simplified use of Verhoeff astigmatic chart

Mr. A. E. Covelle (the designer) demonstrated a very practical arrangement of the Verhoeff astigmatic dial, as well as Snellen charts and muscle light, all of which, with the aid of pulleys, could be operated by the examiner without leaving the patient's side. The Verhoeff charts were on aluminum discs, so arranged that when the astigmatic dial was in position, it exactly covered the supplementary dial, or crossline chart.

James J. Regan,
Recorder.

CHICAGO OPHTHALMOLOGICAL SOCIETY

Dr. Dwight C. Orcutt, president

ILLINOIS EYE AND EAR INFIRMARY

Dr. Harry Gradle, Chief of Staff

Joint meeting, December 18, 1933

Non-operative and operative treatment of strabismus

Dr. J. L. Bressler gave a résumé of the work being done in the Orthoptic

Clinic during the four months it had been in operation. Of about 25 patients in this clinic, four or five might be regarded as cured. This work was handled according to a fixed routine by four therapeutic measures: optical correction; occlusion of the fixing eye; atropine into the fixing eye only; training fusion sense. So far the results had been gratifying.

Discussion. Dr. Samuel Meyer presented a young woman on whom a Himmelsheim operation had been done, transplanting the lateral halves of the superior and inferior recti muscles to the insertion of the lateral rectus muscle, and a complete tenotomy of the internal rectus. There now was abduction of the right eye of about 15 to 20 degrees.

Dr. Robert von der Heydt showed three cases operated by his tucking method using a silver screw clamp. The operation was described in full in the *American Journal of Ophthalmology* for October, 1920.

Glaucoma capsulare

Dr. Robert von der Heydt presented a case of this condition, so described by Vogt in 1925. The condition was now called senile capsular sclerosis and glaucoma capsulare if the eye developed glaucoma. The clouding was dense, especially in the periphery, and less so in the center. The center was grayish and the periphery of the lamella was granular in appearance. The iris glided over the mid area, abrading it. The abrasion was thrown off in the form of a bluish-white fuzz. When the pupil was dilated a central uninvolved disc could be seen, a clear scraped off mid area, and a peripheral granular area exfoliated and rolled up. The glaucoma caused by this exfoliation was fairly common. Vogt had found that 8.6 percent of non-inflammatory glaucoma simplex was caused by this mechanical exfoliation.

Sympathetic ophthalmia

Dr. Louis Hoffman presented a 13-year-old boy who had sustained an injury from a pocket knife which struck his right eye, three months ago on No-

vember 11. There was not much irritation at the time, but ten weeks later the right eye became irritable and blurred; ten days later the pain was so severe that a physician was called, who sent him to the Infirmary. Vision in each eye on entrance was 20/200. He was given 5 cc. of calcium gluconate intravenously and 5 cc. intramuscularly every 12 hours. In three or four days the redness disappeared and the eyes were clear. The vision in the second eye improved to 20/40 on the 9th day. On the 10th day there was a severe reaction with a temperature of 104°. All medication was stopped. In the meantime he was getting 2 drops of 2 percent atropine and 4 drops of adrenalin daily, subconjunctivally. The vision dropped to 20/200 in the good and to 10/200 in the poor eye. After four days, medication was started again. At this time vision in the better eye was 20/50.

Discussion. Dr. W. A. Fisher mentioned a case which he had seen six years ago, a patient with an injury to one eye and sympathetic inflammation of the other; the vision was 4/200 in each eye. A visiting Spanish physician, Dr. Vila Corra, suggested the use of blood serum injections, and two weeks later this patient was presented before the Society with vision of 20/30 in each eye.

Solitary tubercle of the choroid

Dr. N. H. Fox said that the diagnosis of solitary tubercle of the choroid was provisional. This girl, 12 years of age, was brought to the clinic a week ago complaining of blurred vision in the right eye for two months. For the past four years, following measles, she had had a frequent afternoon rise of temperature, with no sweats. Vision O.D. 5/200, not improved with correction; O.S. 20/30, improved to 20/20 with correction. In the macular region of the right eye there was an elevated, smooth, grayish and greenish white mass, irregularly round, somewhat pigmented, with retinal vessels passing over it, and about 1.5 disc diameter in size. At the lower and outer border of the mass, connected with it, there was a smaller and clearer area, possibly an older lesion.

The rest of the fundus was clear. The blood Wassermann was negative.

Discussion. Dr. Robert von der Heydt said that there was a possibility that this might be one of the very rare cases of glioma in a state of regression.

Chorioretinitis gyrata

Dr. Philip M. Corboy said that this case was of doubtful etiology but of unusual clinical interest. There was a peripheral degeneration of the retina and choroid in both eyes. Scattered here and there were small dark corpuscular masses of choroidal pigment, not generalized, but chiefly peripheral. The margins of the retina seemed to present a rounded gyrated appearance, almost wavy. The family history was negative for retinitis pigmentosa. The peripheral fields were contracted to 15 degrees. Central vision was 20/70. The lesion seemed to be limited, and this, with the late onset, the rather atypical pigment corpuscles, their peripheral deposition, and the negative family history, seemed to rule out the diagnosis of retinitis pigmentosa.

Jensen's choroiditis juxtapapillaris

Dr. Francis Cragg said that on October 11th the vision of this patient had been O.D. 20/13; O.S. 20/30. The fundus showed a clouding and elevation, apparently an inflammatory process, acute in nature, in the lower part of the disc and adjacent choroid and retina, particularly on the nasal side. Under treatment with atropine the lesion cleared up promptly in about two weeks. No adequate cause was found.

The condition was probably of a tuberculous nature, as Jensen stated in the literature. S. V. Abraham in 1932, gave the first report of a case histologically. In the sections the choroid was the only part to be disturbed in his case; the patient had infected teeth and several other foci of infection, all of which were removed. He felt that choroiditis juxtapapillaris should be limited to those cases in which the lesion immediately adjoined the disc. He also mentioned that it might be confused with intraocular tumor.

Discussion. Dr. Robert von der Heydt stated that this was a fairly rare exam-

ple of a clinical entity, Jensen's choroiditis juxtapapillaris. It was acute six weeks ago, and now was practically healed and showed a sector-form field defect due to a typical healed choroiditic patch at the disc edge. The lesions were self-limited and healed without treatment.

Cauterization of prolapsed iris

Dr. D. C. Orcutt presented a patient who had had an iris prolapse of the right eye and beginning iris atrophy following an injury by a penknife. After about one week the prolapse had been excised and cauterized and a purse string flap placed over the cornea. The wound was healed and vision had slightly improved.

Discussion. Dr. Harry Woodruff said that a number of years ago Harold Gifford called attention to the occurrence of sympathetic ophthalmia in cases where he had used the galvano-cautery in injuries with prolapsed iris, and issued an emphatic warning against this practice. He suggested as a possible explanation for this occurrence that there was something in the eschar which predisposed to the entrance of infection. He advised, in cases where cauterization was thought necessary, that a chemical cautery be used. Dr. Woodruff added that before his attention had been called to this observation of Gifford's, he had had one case of prolapsed iris in phlyctenular ulcer in which sympathetic ophthalmia occurred following the use of the galvano-cautery.

Dr. D. C. Orcutt said that the reason for cauterizing the wound was because it was infected.

Robert von der Heydt

COLORADO OPHTHALMOLOGICAL SOCIETY

December 16, 1933

Dr. E. E. McKeown presiding
Restoration of socket with Thiersch grafts

Dr. F. L. Beck presented a case of Drs. Strader, Beck and Lucic in which the entire conjunctival surface of the globe and lids had been destroyed by caustic alkali. After evisceration the

cul-de-sacs were completely obliterated by adhesions of the lids to the stump. The lids were dissected free and a large Thiersch graft, covering a dental stent, was placed in the orbital cavity. There had been a tendency for the fornices to become shorter, rendering a complete closure of the lids over a prosthesis impossible. Recently the upper cul-de-sac had been extended by further dissection and the introduction of grafts on an artificial eye as a stent had resulted in the fairly satisfactory condition shown.

Discussion. Dr. W. H. Crisp felt that the results in this case were very favorable so far, but further work would be necessary to enlarge the upper fornix.

Neuroretinitis of doubtful etiology

Dr. W. H. Crisp presented a man aged 55 years, the vision of whose right eye was reduced to 5/60 by neuroretinitis. The vision of the left eye had been almost entirely lost for two or three weeks in the spring of 1933, but had subsequently recovered. At that time the patient had seen another oculist, but he discontinued care when the left eye showed improvement. On November 28, 1933, the vision of the left eye was 5/20. The right eye then showed moderate papilledema, a few small hemorrhages, very tortuous vessels, some patches of exudate, and a pronounced wooliness of the retina; and the left eye showed tortuous and distended veins and one minute hemorrhagic spot between the disc and macula. Findings as to renal and circulatory disease were negative, and entirely negative results were also reported from Wassermann and other examinations of blood and spinal fluid. The man's general health was excellent. Several diseased teeth had been removed. The ocular condition was approximately stationary.

Discussion. Dr. W. C. Sedwick inquired particularly regarding the condition of the sphenoid sinus, and advised opening of this sinus regardless of the clinical findings.

Intractable corneal ulcer secondary to tic douloureux, trauma and dacryocystitis; cured by conjunctival flaps

Dr. R. W. Danielson presented the case of Mr. J. W. K., aged 75 years,

who was first seen on July 2, 1933, with the history that a small chip of rock had struck his right eye a week previously. Within 24 hours the eye had become swollen and red. The past history was negative except for an alcohol injection of the right fifth nerve by Dr. Bluemel about eight years ago for tic douloureux.

On examination there was found a corneal ulcer with descemetocoele, iritis and fibrin in the anterior chamber, and chronic dacryocystitis with much pus expressible from the sac. The sac was removed on July 3, but the ulcer did not heal in spite of local applications of iodine, dionin instillations, subconjunctival bichloride of mercury injections, two treatments by thermophore, and about eight Saemisch incisions. On August 10, 1933, a double conjunctival flap was made. When it finally pulled loose there was a broad adhesion of conjunctiva from below, about half of which had been cut away. Dr. Danielson raised the question of the advisability of surgical removal of the remainder of the adhering flap.

Discussion. Dr. Melville Black did not advise surgical interference. He was of the opinion that the flap would gradually retract with considerable improvement in the appearance within a year.

Dr. V. H. Brobeck thought that the intraocular tension was definitely elevated and that because of this the prognosis was extremely unfavorable.

Interstitial keratitis; marked improvement following treatment with tertian malaria

Dr. John Long presented the case of T.R., aged 19 years, who developed interstitial keratitis in January, 1933. The patient also had Vincent's angina which was cured by the first few injections of neoarsphenamine. The Wassermann reaction was positive. The vision of the right eye was fingers at one foot, and the left eye light perception. The patient was treated with thiobismol and neoarsphenamine and was also given several intravenous injections of typhoid vaccine for the foreign protein effect. The ocular condition became worse under treatment. In May, 1933,

the patient was inoculated with tertian malaria. There was marked improvement in the ocular condition almost at once. After eleven chills the malaria was terminated. The patient had been receiving antiluetic treatment since. At the time of presentation the vision of the right eye was 0.5-3.

Discussion. Dr. Edward Jackson said this was a most severe case of interstitial keratitis, and the most rapid and complete cure he had ever seen. He felt that the patient would have two useful eyes. He cited the work of Ambler and Vancleve, who had not found any recurrences following this type of treatment.

Dr. W. H. Crisp cited the case of a boy in whom interstitial keratitis had responded well to strenuous antiluetic treatment although the blood Wassermann remained positive. The condition recurred a few years later. Dr. Crisp felt that rest in bed was a very valuable part of the treatment.

Dr. John Long said that inoculations with malaria should be given only when the patient was in good condition. Malarial therapy might abort early central nervous system involvement.

Dr. J. L. Swigert said that injections of colloidal sulphur would give the same reactions.

Pseudo-retinoblastoma

Dr. J. L. Swigert presented the case of J.T., aged two and one-half years. The parents gave the history that four or five weeks ago they had noticed a white mass behind the pupil of the left eye. There had not been any complaint of pain or inflammation in the eye. The past history was negative with the exception of severe pneumonia six months ago. The general physical condition was now good. Examination showed the anterior segment of the eye to be normal. Behind the lens in the nasal vitreous there was a soft white flocculent mass which was somewhat mobile. The condition was in all probability a pseudo-retinoblastoma secondary to the pneumonia.

Discussion. Dr. Melville Black was of the same opinion. He was cognizant of the danger, but advised watchful waiting.

Dr. F. R. Spencer thought that the mass was too white and soft-appearing for a tumor.

Dr. G. H. Stine also felt that the appearance of the mass suggested an inflammatory condition rather than a retinoblastoma, and thought that studies with the slitlamp might be very valuable.

Pseudo-retinoblastoma; pathological report

Dr. R. W. Danielson and Dr. John Long reported follow-up notes and showed microscopic sections of the case of Julius M., who was presented at the November meeting. Enucleation had been performed a few days later. There was complete detachment of the retina, but no evidence of tumor growth at any point was found. Near the attachment of the retina to the optic nerve there was a nodule composed chiefly of dense hyalinized connective tissue, containing a large deposit of lime salts. There were also a few trabeculi of osteoid and early bone formation. There were also many clefts indicating the presence of cholesterol crystals.

Discussion. Dr. W. H. Crisp felt that there had been a defect in development due to early injury either ante-natal, natal or post-natal. The calcareous deposits indicated a condition of long standing.

Retinal detachment

Dr. W. M. Bane reported the case of Mrs. L. P., colored, aged 40 years, who had come from out of town the day before, to have her eyes examined because of failing vision of the left eye. She had noticed this trouble following extraction of her teeth one year ago on account of very severe left facial neuralgia. The neuralgia had been better, but the vision worse. At the time of presentation a physical examination had not been made owing to inconvenience and lack of time. Her physician at home had told her that her blood pressure was about 200, but lately it had been 160. She was on a meat-free and very restricted diet.

Her vision in the right eye with correction was 5/7-2, in the left eye, poor light perception. The pupils were equal

and responded to light. The tension was normal. The lenses showed cataractous spicules involving the anterior and posterior layers of the cortex, with much clear substance remaining. The vitreous seemed clear. The right disc appeared pale; the vessels showed evidence of sclerosis at some of the crossings. There were many patches of exudates scattered throughout the retina, and a few small hemorrhagic exudates. The left retina and vessels were far forward, seen with any strong plus lens from +6 to +14 diopters. The detachment was not easily studied because of the central lens opacity. It appeared to be a detachment rather than a retinitis proliferans, although there were several bands suggesting proliferans.

Discussion. Dr. F. R. Spencer was of the opinion that there was some force pulling the retina forward. The tension was normal to palpation. He advised a trial of antiluetic treatment in an attempt to rule out the diagnosis of tumor.

Dr. Melville Black felt that the detachment was probably due to retinitis of renal or hemorrhagic origin.

Dr. E. E. McKeown discussed the possibility of dental infection as an etiological factor.

Pemphigus of the conjunctiva

Dr. V. H. Brobeck reported the case of Miss M.N.T., who began to have trouble with her eyes in December, 1932. Photographs of the condition at the present time were exhibited. General examination including blood studies, were negative as reported by her physician, Dr. George Anthony of Wellesley. Superficial ulceration of the turbinates and both sides of the septum were noted by Dr. Margaret Kleinert of Boston. These responded to silver nitrate applications.

The above data were furnished through the kindness of Dr. J. Herbert Waite of Boston. In April, 1933, he found a mild trichiasis on each side and in the right eye a small conjunctival hemorrhage with a symblepharon at the outer canthus. No evidence of trachoma or pannus was noted. Ocular discomfort had persisted for four months despite efforts at amelioration

by several oculists. Dr. Waite suggested a diagnosis of pemphigus.

The patient reported to Dr. Brobeck on November 23, 1933, complaining of pain, photophobia and lacrimation. The conjunctivae of both eyes had undergone much degeneration and cicatricial contraction. There was a symblepharon at the outer canthus as noted by Dr. Waite. The corneae were clear except for a small degenerative area on the right side at "9 o'clock." Slitlamp examination was unsatisfactory due to the photophobia. Many inturning cilia were removed at this time. No bullae were seen, but there had been noted from time to time a membranous deposit.

Discussion. Dr. F. R. Spencer cited a similar case, and mentioned the rarity of this condition. In his case only one eye was seriously involved, the other mildly. Eventually one eye became blind. He felt that corneal scars would finally develop in this case.

Dr. Edward Jackson mentioned a case shown to the society by Dr. W. C. Bane in which one eye recovered following radiation treatment. The other eye became involved later, and did not do so well.

Dr. E. R. Neepser suggested the use of the Shahan thermophore. He had had a case in which there was some benefit following a period of three months' treatment in this manner.

Dr. W. A. Sedwick stated that good results had been reported following autohemotherapy.

Dr. V. H. Brobeck stated that in this case he had been using high vitamin diet, Fowler's solution, and holocain ointment.

Acute congestive glaucoma developing in the course of early glaucoma simplex

Dr. G. H. Stine reported the case of Mrs. D.H.S., aged 63 years, who had first consulted him in November, 1930, with all the symptoms of chronic simple glaucoma. The trouble had started in the right eye eight years previously, and this eye was in the state of absolute glaucoma. Attacks of blurring and haloes began in the left eye three years previously. The vision of the left eye was 1.2. The left eye did not appear

glaucomatous except for the shallowness of the anterior chamber. The visual fields were normal. The patient lived out of the state and had presented herself for observation every six months. Pilocarpin had been sufficient to keep the tension continuously within normal limits. In August, 1932, a long, narrow, sinuous scotoma extending from both upper and lower poles of the blind spot and arching above and below fixation was elicited. Other than that no change in the eyes had been observed. An elimination diet for food allergy had been faithfully adhered to, and the patient was otherwise in good health.

On November 16, 1933, the patient was again seen for the first time in over a year, when she developed an attack of acute glaucoma in the left eye. This attack had started 24 hours before the patient was seen. The patient was in terrific pain. The cornea was very edematous; the pupil was irregular, moderately dilated and fixed; there was considerable ciliary and episcleral injection of the eye; and the eye was stony hard. No fundus reflex could be seen. The patient was immediately hospitalized, given morphine and other sedatives. One percent eserine was frequently instilled and hot packs applied without any change in the condition within the next few hours. Paracentesis was done without any permanent effect. Twenty-four hours later iridencleisis was performed under nitrous oxide anesthesia, and was followed by immediate relief of pain and reduction of the tension. However, there developed considerable striate keratitis consisting of many folds and lines in Descemet's membrane running in all directions. There was considerable edema of the cornea. A moderate iritis with posterior synechia at "10 o'clock" necessitated the use of atropine. At the time of reporting, the eye was apparently quiet. The tension had remained about 15 mm. (new Schiötz). The drainage was apparently good, but the corneal striations and edema were clearing very slowly. A good fundus reflex could be seen, but no details of the fundus could be made out. The vision was about 1/20, but was very slow in improving. Dr. Stine felt

that the corneal condition would ultimately clear, but reported the case because of the interesting corneal complications, and asked for the opinion of the members regarding the prognosis.

Discussion. Dr. Edward Jackson reported a case of acute glaucoma in which iridectomy had been performed at the end of 48 hours. Although the tension was permanently reduced the vision never recovered fully. He felt that in the case presented the prognosis was fairly good.

R. W. Danielson,
Secretary.

ROYAL SOCIETY OF MEDICINE, LONDON

Section on Ophthalmology

November 10, 1933

Mr. A. C. Hudson, president

Congenital abnormalities of the iris and lens

Miss Ida Mann in 1924, had showed, at a meeting of the Ophthalmological Society, some embryological specimens bearing on the mechanism of production of coloboma iridis. At that date she was interested in the fact that at a certain stage in normal embryos of man and other mammals the capsulo-pupillary vessels, as they curled over the rim of the optic cup, produced small indentations in the rim. In one of the specimens of abnormal human embryos one of the vessels had persisted beyond its normal stage, and, by interfering with the growth of the iris-forming rim of the optic cup seemed on the point of causing a coloboma. If this was a common factor in the genesis of coloboma, she considered that it should be possible to demonstrate clinically some traces of abnormal vessels. Occasionally its presence could be demonstrated in adult life. In 1900, von Hippel showed a section of an adult eye with a large vessel pulling the iris backwards at the apex of a coloboma.

Miss Mann gave outlines of six cases to show the kind of thing which one would expect, and exhibited on the epi-

diascope some fine drawing which she herself had made of her findings. She said that the case brought out the following points: 1. The persisting vessel could occur in any situation around the equator of the lens. 2. There was always a gap in either the ectodermal or the mesodermal portion (or both) of the iris. 3. Evidence of persistent pupillary membrane could also be found, either as tags from the lesser circle or as pigment spots on the anterior lens capsule. 4. If the zonule could be seen, there would be a gap in it. 5. Usually there was a notch in the margin of the lens. 6. Often there was an opacity in the lens confined to the region of the coloboma. 7. The persisting vessel could sometimes be seen, but more often it had been found to have atrophied after having produced the abnormalities.

Metastatic carcinoma of the choroid

Mr. A. C. Hudson read a short communication on this subject. He said the patient had suffered from lumbago, for a month before removal of the right eye, and had died seven months later with signs of malignant disease involving the thorax, right lung, and vertebral column. The choroidal tumor was a papillomatous adeno-carcinoma. A post-mortem examination could not be made so it was not possible to determine with certainty the site of the primary tumor. In a total of 149 recorded cases of choroidal carcinoma there were only 51 in which the primary growth had been elsewhere than in the breast, and in many of these the choroidal tumor had been described as adeno-carcinoma or papillomatous adeno-carcinoma.

An optometer

Mr. J. D. Magor Cardell demonstrated a new instrument he had designed. It was an instrument for testing the sight of bed-ridden patients, or those who had to be seen in their own homes. It was possible by its means to carry out the Snellen's distant test, the duochrome test; and the use of the rotating astigmatic fan was also practicable. Any conveniently placed light in the

room was viewed through the tube held in contact with the cheek of the patient. The cap at the other end might be changed for any of the other tests mentioned. There was enough room between the tube and the eye to accommodate a trial frame, and to allow the use of a cross cylinder. The instrument weighed only 8 ozs.

The Kayser-Fleischer ring of the cornea in Wilson's disease

Dr. S. A. Kinnier Wilson showed two instances, in children, of this condition. He said that lenticular degeneration was rarely seen, and this Kayser-Fleischer ring was rarer still. He had seen the ring no more than three times, one of the instances occurring in Denmark. When the children presented themselves at the hospital it was felt that they were postencephalitis cases. There was a defect in the pyramidal system, as there was difficulty in articulation, and the tremor they exhibited was that seen in a Parkinsonian case. When the boy was taken into the well-lighted ward, the ring on the cornea became at once evident; its color Dr. Wilson described as greenish-olive golden. It appeared to consist of minute granules of pigment deposited on the under surface of the cornea. The ring must be associated with cirrhosis of the liver, a condition both these children had, though not as yet advanced, as their levulose test was negative. It was said that at least five-sixths of the liver must be diseased to give the positive response. In 1912, it was noted that the ring was appearing in cases which resembled what now received the name lenticular degeneration. The liver disturbance in these cases always preceded the nervous manifestations. The liver disease in these instances must be of a very rare kind, otherwise the ring would be much more often seen.

Three cases of arachnodactyly with ocular signs

Mr. E. F. King said that the first of these patients, a woman aged 37 years, had poor vision in both eyes, not improved by glasses. The right eye

showed iridodonesis, and there was moderate dilatation of the pupil to mydriatics. There was ectopia lentis up and in; throughout the lens there was a diffuse haze, and also, fine vitreous opacities. Below the right optic disc was choroidal scarring. Vision was 6/60; with a +1.00 D. sphere it was 6/36.

The second patient was a daughter of the first, aged 18 years. Her vision had never been very good. In both her eyes iridodonesis was present. She was of normal build, but had unusually long fingers.

The third patient was also a daughter of the first, her age being 13 years. The more defective eye was the left, and she had always worn glasses. She had coloboma lentis medially. In other respects her state was much the same as the previous patient's.

Three cases of congenital nuclear hypoplasia

Mr. Frank Law said that in the first of these patients the condition had been present since birth; there was bilateral facial palsy. The eye movements were limited to depression and elevation, and there was defective closure of the lids. When attempting to close the lids, there was a rolling upwards of the eyeball under the upper lids. The patient had had a nevus of the scalp, but that had been removed.

The second patient, a girl, had bilateral facial palsy and a convergent squint. She had some definite adduction in each eye, but this was very limited. There had been some improvement in her facial condition following electrical treatment.

The last of the cases was that of a boy. The parents noticed that when he was five years old he did not raise his head. He had deficient elevation, no abduction, and convergence was either weak or was quite absent. These cases illustrated that the eye trouble was not the only disability in these cases. The first had club-foot, cured by many operations, the second had hare-lip, and the third a nevus and rudimentary accessory auricle and undescended testicle. (Reported by H. Dickinson).

ROYAL SOCIETY OF MEDICINE, LONDON

Section of Ophthalmology

December 8, 1933

Mr. A. C. Hudson, president

Ocular sarcomata, two cases

Mr. Lindsay Rea said the first case was that of a woman, aged 77 years. A small brown mass on the gray iris of one eye was diagnosed as a malignant growth. Radium had been used but this treatment resulted only in a stubborn conjunctivitis. The eye was removed and the tumor was found to be a spindle-cell sarcoma.

The second patient, a man 64 years old, was seen three months previously. At that time there was a small fatty tumor resting on the sclera of the right eye at the point of insertion of the superior rectus muscle. A solid tumor was excised and diagnosed by the pathologist as lymphosarcoma, apparently metastatic. It was learned later that the patient suffered from an obscure abdominal ailment. The man returned with a recurrence, the eye being pushed outside the orbit. The tumor and eye were removed. There was evidence that the spleen was the primary site of the sarcoma.

Malignant melanoma of the lids and conjunctiva

Mr. A. Rugg-Gunn showed a man 64 years of age. He was first seen by the exhibitor five years earlier, because of many irregular, deeply-pigmented patches in the palpebral and bulbar conjunctiva in the right eye. The man thought they had been present since birth. A year ago there could be seen a black pedunculated growth 4 mm. across, attached to the bulbar conjunctiva, near the semilunar fold. It was excised and found to be melanotic sarcoma.

In a second case the melanomata had involved the skin and palpebral conjunctiva. These were dealt with by exenteration. The occasion for the man first attending for advice was that he had sustained a lime burn of the eye,

and examination revealed a pigmented nodule .5 cm. in diameter, in the right upper eyelid and the palpebral conjunctiva. The larger nodule was excised, and was found to permeate the whole thickness of the lid at its margin. Section from both these growths showed sarcoma. Usually such growths were classed as carcinomata. The exhibitor thought these growths were radio-sensitive, and that in this respect there was some difference between those of the palpebral and those of the bulbar conjunctiva. The difficulty in treating these cases of multiple growths was that while giving a lethal dose of radium to one tumor, others might receive a sub-lethal stimulating dose of the irradiation. He asked whether it was possible to bombard the whole area with radium at one time.

Discussion. Mr. Humphrey Neame said he had not used radium for conjunctival growths, except in the horse; and the animal stood it well. He considered it would be uncomfortable for the present patient to have radium needles buried under the conjunctiva for several days, and a radium bomb would damage the eye. There was also a risk of causing cataract.

Multipuncture diathermy operation

Mr. J. Cole Marshall showed a woman, aged 72 years, whose sight failed suddenly. She was found to have a projecting detachment of the retina

in the upper half of the temporal quadrant; the retina was degenerated. There was a horse-shoe tear. Scleral puncture was done 14 mm. from the limbus and considerable fluid escaped. Though the eye softened, the retina was not quite back in place. Four days later the retina became re-attached; no hole was visible. Two days later a re-detachment took place, and now a hole was visible, and a day or two later detachment was complete. Scleral stippling and diathermy punctures were therefore made. Despite the fact that the patient got out of bed, the retina at the time of showing the patient, was back in place, and no scar could be seen. With correction, vision was now 6/24.

Traumatic monocular Argyll Robertson pupil

Mr. Rugg-Gunn showed a boy, aged 9 years, who was knocked down by a car in May, 1933, and was delirious thereafter for some days. X-rays showed a fracture of the skull vault. Both tympanic membranes were ruptured. All movements of the right eye were paralyzed, though ptosis was not complete. There was no proptosis. Vision had not been affected, but there was loss of all power of upward movement of the right eye, and also of accommodative power. It was considered that this was a partial sphenoidal fissure syndrome.

(Reported by H. Dickinson)

AMERICAN JOURNAL OF OPHTHALMOLOGY

PUBLISHED MONTHLY BY THE OPHTHALMIC PUBLISHING COMPANY

EDITORIAL STAFF

LAWRENCE T. POST, Editor
640 S. Kingshighway, Saint Louis
WILLIAM H. CRISP, Consulting Editor
530 Metropolitan building, Denver
EDWARD JACKSON, Consulting Editor
1120 Republic building, Denver
HANS BARKAN
Stanford University Hospital, San Francisco
HARRY S. GRADLE
58 East Washington street, Chicago

H. ROMMEL HILDRETH
824 Metropolitan building, Saint Louis
PARK LEWIS
454 Franklin street, Buffalo
M. URIBE TRONCOSO
350 West 85th street, New York
M. F. WEYMANN
903 Westlake Professional building, Los Angeles
JOHN M. WHEELER
30 West Fifty-ninth street, New York

EMMA S. BUSS, Manuscript Editor

Address original papers, other scientific communications including correspondence, also books for review and reports of society proceedings to Dr. Lawrence T. Post, 640 S. Kingshighway, Saint Louis.

Exchange copies of medical journals should be sent to Dr. William H. Crisp, 530 Metropolitan building, Denver.

Subscriptions, applications for single copies, notices of change of address, and communications with reference to advertising should be addressed to the Manager of Subscriptions and Advertising, 640 S. Kingshighway, Saint Louis. Copy of advertisements must be sent to the manager by the fifteenth of the month preceding its appearance.

Authors' proofs should be corrected and returned within forty-eight hours to the editor. Twenty-five reprints of each article will be supplied to the author without charge. Additional reprints may be obtained from the printer, the George Banta Publishing Company, 450-458 Ahnaip street, Menasha, Wisconsin, if ordered at the time proofs are returned. But reprints to contain colored plates must be ordered when the article is accepted.

COLOR FILTERS IN THE RETINA

For more than a century the macula lutea, or yellow spot of Sommering, has figured in all descriptions of the retina. Huxley pointed out that it quickly disappears after death. Gullstrand, on account of the difficulty of seeing it with the ophthalmoscope, thought it was a post-mortem phenomenon. But Von der Hoeve, and others, have demonstrated it during life. Vogt, with his red-free light made it easy for many observers to study it. Of late years it has taken its place in the color plates of the fundus, as seen by such illumination. In the retina of man, and the primates most nearly related to man, there is certainly a yellow spot.

About ninety years ago Valentin and Hannover discovered colored oil droplets in the retinal cones of some vertebrates. These are generally situated at the outer end of the inner segment of the cones. In the same eyes there are also similarly placed droplets that are not colored. From time to time such

droplets have been observed in many widely scattered species. An extensive literature has grown about this subject, including independent observations, sometimes contradictory, with suggestions of the probable function of such droplets and their colors. Recently this literature has been studied and checked with new observations, by Walls and Judd. (British Journal of Ophthalmology, November and December, 1933.)

In the great majority of observations the color of the droplets has been yellow. In some species red droplets are found, and in one bird they are distinctly green. Other colors have been reported; but chiefly in the earlier years, when the microscope objectives were not strictly achromatic. Observations recently repeated with objectives more completely achromatic seem to show that the other colors are not present. Such droplets are either red, yellow, or nearly yellow, as the yellowish green. For species not otherwise accessible, Walls and Judd have secured the co-

operation of other observers, so that this prevalence of the yellow color seems well established.

The vascularity of the retina has also been studied; and in some species where no yellow was found in the retinal tissue, a similar color light may be produced by the blood in the capillary network. In some species devoid of capillaries and of yellow in the retina, the cornea or the crystalline lens has been distinctly yellow. The mass of evidence thus brought together seems to show that the yellow tissue and droplets serve as a color screen, such as has been found serviceable in photography and glasses for outdoor use.

The species that have this yellow screen in their eyes are not confined to any one division of the animal kingdom but occur among fish, reptiles, birds and mammals. Often in two closely related species, one will have oil drops that are yellow, and the other will have those that are all colorless, and both yellow and colorless drops are found in the same eye. A wide review of the habits of these animals seems to show that those which have the yellow color filter are diurnal—use their eyes in strong light. Those that have no such color screen are nocturnal, and use their eyes chiefly, or wholly by feeble light. Walls and Judd are convinced that this is the significance of the distribution of these color filters.

The most brilliant part of the solar spectrum that gives us the ordinary white light, or daylight, is in the yellow. Chromatic aberration, the inability of a lens to focus light of different colors at the same distance, hindered the perfecting and use of optical instruments for hundreds of years. Nature seems to have met this difficulty by the color filter; cutting out the light that could not be focussed close to the yellow, where the greater part of the light would focus. The blue and violet rays, for which the aberration is greatest, and the red rays, for which the brightness rapidly diminishes as they depart from the yellow, are excluded, without greatly diminishing the brightness. This works well only in good light. At night the proportion of the blue, or violet, would leave the il-

lumination greatly diminished, if they were excluded. Red droplets exclude the blue, and may be of special advantage to some animals, as some birds that feed chiefly in the dawn and twilight.

The general existence of uncolored droplets, along with those that are yellow, would suggest that the droplet may perform the function of a condensing lens, even where no color filter is needed. The wide distribution and varied character of uses they might serve, should stimulate further investigation of their frequency and variation. Their absence from many eyes should suggest that colored glasses in front of the eye are by no means so widely helpful, or necessary, as the makers of such glasses would have the profession and the public believe. It may also explain the lasting popularity of the yellow and yellow-green glasses as eye protectors.

Edward Jackson.

THE PROBLEM OF REBATING

In theory the medical profession and the organizations of those who limit their practice to ophthalmology, or to ophthalmology in combination with otology, laryngology, and rhinology, have set their faces strongly against what is known as rebating, that is against acceptance from a wholesale or retail optician of the difference between a trade or wholesale price and the retail price paid by the patient for his spectacles and lenses.

Pious resolutions or rules condemning this procedure have been adopted by various national and local ophthalmological societies. A "pious resolution" is one which does not produce substantial results, and the expression is here applied because the practice is still carried on by members of every organization which has condemned it. Quite probably, in the larger cities, at least sixty-five percent of all prescriptions written by physicians for glasses are filled through wholesale or retail opticians who collect the retail price from the patient and credit to the prescribing physician the difference between retail and wholesale.

A sort of rebating exists very widely

in trade as distinct from professional relationships. The purchaser of an article may buy from the retailer, paying the retail price, out of which the dealer must compensate the wholesaler, meet overhead charges, and derive whatever margin of profit is available. Or, in some cases, the customer may go direct to a wholesaler who sells also at retail and collects the full retail price himself. Or the customer may be referred by a retailer to a wholesaler who actually delivers the article to the customer, charging the wholesale price to the retailer who referred the purchaser. But in this case it is usual for the retailer concerned to take the risk of collecting the account from the customer; and, so far as the present writer is informed, most trades do not permit actual rebating, or the collection of an account by the wholesaler with subsequent credit to the retailer of the difference between the two prices.

As a rule, it may be stated that trade objections to the type of rebating found among ophthalmologists do not depend upon the question of morality in a retailer's accepting payment for salesmanship conducted by the wholesaler, but rather upon the demoralizing effect of such a procedure upon trade relations.

Professional ethics have commonly frowned upon a physician's combining trade with his profession. Yet ophthalmologists in the smaller communities would often find it distinctly inconvenient to rely upon a local optician to fill prescriptions, and they are in large measure obliged to fit the patient with glasses which they order from a wholesale optician in a larger city. The problem here is not strictly one of rebating, for the ophthalmologist makes the retail charge direct to the patient and undertakes the responsibility of collecting the account. But even here some puzzling combinations occur. In his home town a college student may have obtained through the local ophthalmologist spectacles which he breaks while away at college, and he may then find it necessary or convenient to go to the wholesale optician for repair or replacement. In such case, it is not unnatural for the wholesale optician to accept a

retail payment from the student, billing the author of the prescription with the usual trade difference.

The answer may be that such exceptional cases could be overlooked; and many ethical ophthalmologists are prepared, under mild protest, to recognize the right of their professional brethren to fill their own prescriptions provided they buy the glasses from the wholesaler and sell them direct to the patient. The practice which from the professional point of view is utterly condemned is that of sending a patient to a wholesaler (or retailer) for actual fitting of his spectacles, allowing the optician to collect from the patient the full retail charge, and then profiting by a monthly settlement in which the prescribing physician receives a secret profit which is not payment for work done and of which the patient is entirely ignorant.

The practice is immoral and unprofessional, but what can we do to stop it? Rules and resolutions, already referred to, have accomplished little. In the present writer's home state, there has existed for many years a law aimed at this abuse as a part of the larger problem of acceptance of commissions in surgical practice. The fact that no physician has ever been prosecuted under this law is certainly not proof of lack of offenses against it, but is simply another demonstration of the fruitlessness of passing laws not actively supported by popular sentiment.

An oculist in one city has vigorously agitated this question upon several occasions. He is particularly alarmed by the prospect that the derelictions of ophthalmologists in this matter will be brought to unfavorable public attention through the Better Business Bureau, and further that unscrupulous opticians will not hesitate to profit by this opportunity of belittling the profession of ophthalmology.

At a meeting of the local society it was resolved to request the optical dealers whenever a patient paid for glasses, frames, or other optical accessories the purchaser should be given a receipt showing plainly what proportion of the amount so paid was to be retained by the optician and what amount was credited or paid to the account of the

physician or agent making the reference.

If such a request were loyally and consistently complied with by all optical dealers, the effect could hardly be open to question. Some laymen would excuse the practice, but the vast majority would condemn it. But is such loyal and consistent compliance to be anticipated? It is common report that the practice of rebating has become much more widespread since it was popularized, as a means of trade advancement, by one of the largest optical corporations in the United States. In such a situation, not professional morality but commercial self-interest is the dominating factor. Together the bootlegger and the lawbreaking public made prohibition of alcohol unsuccessful. We are already advised that another kind of bootlegger is likely to invalidate the moral purpose of the new law regulating stock exchanges. Would not bootleggers defeat any attempt by associations of optical dealers to give effect to the resolution of the local societies?

W. H. Crisp.

CLASSIFICATION AND TREATMENT OF STRABISMUS

At the Section on Ophthalmology of the American Medical Association which met in Cleveland on June 13, 14, and 15, a most interesting paper on practical details in orthoptic treatment of strabismus was read by Dr. George P. Guibor. This was a further report on a subject with which he has dealt before but was by far the most valuable contribution that he has made because of the maturity of the project about which he was writing. It contained a comprehensive classification of strabismus types as related to the possibilities of orthoptic training and a summary of the routine of training in cases of non-paralytic strabismus.

Eight types of non-paralytic strabismus were differentiated, the last being various combinations of the first seven. The differential diagnosis was carefully considered at some length. This clear cut presentation will be a very welcome practical aid to all who are interested in the treatment of muscle anomalies. The

study of a large group such as this from the Northwestern University Clinic is necessary to establish a working classification. Most ophthalmologists see many strabismus cases but have failed to differentiate them satisfactorily. An outline such as this will be an immense help not only in private practice but in clinic work. It is quite possible that this classification will need a later revision but at least it makes a good starting point.

The kind of treatment naturally depends on the classification of the condition. The essential feature of the paper was the orthoptic training and the definite outline for this was given; something long needed in condensed form.

The results in the fairly common type due to amblyopia are perhaps not as encouraging as might be hoped but more in accord with the results obtained by most ophthalmologists than some of the previously reported statistics.

Similar orthoptic clinics are being held in other cities. The one at Washington University in Saint Louis is now eight months old and beginning to show results. Thus far, reports from large clinics have been principally confined to the study of the tropias and a more difficult but more needed analysis is that of the phorias. Here the enthusiasm of instrument salesmen and of many optometrists has undoubtedly painted a picture far rosier than results would warrant.

Clinics will develop best by starting with the strabismus cases but should then be able to proceed to the study of the phorias and evaluate the possibilities of muscle training in these conditions.

Lawrence T. Post.

BOOK NOTICES

Seeing and Human Welfare. By M. Luckiesh, Sc.D. 212 pages. Illustrated. Published by Williams and Wilkins Co. Baltimore, 1934. Price \$2.00.

This book is written for the general reader, by the Director of the Lighting Research Laboratory of the General

Electric Company. It would be expected to advocate good lighting. But it does more than this. It tells what good lighting really is, and the scientific basis for judging it is good lighting. Some of the investigations as to seeing have been published in this Journal (v. 15, p. 801); but this book brings together from the fields of optics, physiology and psychology, the important facts that bear upon its subject.

Each of its eight chapters opens with an illustration that reveals and enforces its principal thought. Scattered through each chapter are such headings as: Poor Seeing is Costly; Civilization's Abnormal Demands, A Double Penalty (more work and less light); Sense Capacity and Attention, Factors of Safety, The Human Seeing-Machine. The Science of Seeing has one chapter, Visibility of Objects another, and the last is given to Suggestions for Further Study. The last chapter is brief, but it gives suggestions of some books, not generally brought to the attention of ophthalmologists.

The book is one to be read by physicians interested in the eye and its diseases, because it will help them to a broader and clearer view of their own daily work. It brings the fact of evolution of eyes for outdoor seeing from the domain of biology, and the wide experience of engineers of the need for a "factor of safety," to bear directly on the conditions of eye disease, and eye deficiencies. It shows how in the literal "dark ages," of cave dwellers and workers by camp-fires, and pioneers of the tallow-candle period, have come down customs and superstitions, that handicap the users of eyes in the tasks of modern life. It should be read by the eye physician, both to develop his own knowledge and attitude toward improved lighting, and to advise his patients, what they should read, to correct their false impressions on these subjects. The importance of seeing to human welfare is still very imperfectly appreciated.

Edward Jackson.

Bulletin de la Société Belge d'Ophthalmologie, no. 67. Transactions of the

67th meeting of the Society at Brussels. Paper covers, 132 pages, illustrated. Price not stated. Brussels, Imprimerie Médicale et Scientifique, 1934.

The papers and more important reports in this record of the society's meeting on November 26, 1933, will be noted in the abstract department of the American Journal of Ophthalmology.

Modern drug encyclopedia and therapeutic guide. By Jacob Gutman, M.D. 1393 pages. Published by Paul B. Hoeber, Inc. New York. 1934. Cloth. Price \$7.50.

This is an extremely comprehensive drug encyclopedia including almost all of the most recent prescriptions. The list includes not only official but "non-official, proprietary, patented, Council-Accepted, and others that are popular with the medical profession. Prescriptions, statements, analyses and all other data are offered without change or comment but as found available in the numerous standard works and references consulted, or as obtained from the producers and distributors of the respective products."

The arrangement is alphabetical, by drug or distributor. "Separate chapters are devoted to preparations of similar character; in each chapter like products are grouped, and preceded in each instance by a brief description with suggestions for their practical application; for each drug its various methods of administration, with dosages in the metric and U. S. systems, are presented."

The book is intended for practical every day use. It is divided into eleven chapters which in general represent different types of medicaments.

The last chapter is a therapeutic guide in which three pages are devoted to preparations useful in ophthalmic practice. Obviously throughout the book occur drugs which are used by the ophthalmologist in connection with specific ocular agents.

A reference book such as this is a great aid to a specialist. Without some such treatise he tends to limit his gen-

eral therapeutics to a relatively small number of preparations overlooking many superior preparations with which he is not sufficiently familiar to venture prescribing unless he can check the exact composition and dosage.

Lawrence T. Post.

OBITUARY

Peter N. K. Schwenk, M.D.

In the passing of Dr. Peter N. K. Schwenk, ophthalmology suffers the loss of one of the most outstanding clinicians of this generation. He was born in Valley View, Pennsylvania, August 24, 1854, son of Abraham and Catharine (Klinger) Schwenk. He received his preliminary education in the Lewisburg High School and Bucknell University. He was graduated in Medicine from the University of Pennsylvania in 1882. On February 10, 1891, he married Mary R. Shepp of Tamaqua, Pa., who survives him. The early part of his career was spent in general practice although he became associated with the Pennsylvania Hospital with the late George Harlan in the Eye and Ear Department and subsequently with this same distinguished surgeon at the Wills Eye Hospital in Philadelphia. His service at the Pennsylvania Hospital began in 1883 and terminated in 1915 during which period he rose from clinical assistant to surgeon. His service at Wills Hospital began in 1897 and terminated in 1924. Here also he began as clinical assistant and rose to be surgeon. Upon his retirement, in both institutions he was elected surgeon emeritus, and although he had attained the age limit as to years he retained his youthful vigor and the ability to discharge the most onerous duties of his calling up to within a very short time of his demise. His affiliation with Dr. George Harlan, who had served with distinction in the Civil War and who was one of the pioneers in American ophthalmology, effected a valuable connecting link between the surgeons of an older period and those of the present generation. This period was an epoch marked by accurate clinical observation and large individual experiences, so that Dr. Schwenk pro-

vided his internes and young assistants with a fund of valuable information and assistance, that is no longer available with the wide distribution of ophthalmological activities, as was the case when such activities were concentrated in the eastern cities. Dr. Schwenk's kind and considerate nature smoothed the way for many a timid novice in ophthalmology and constituted a welcome haven of refuge in the face of the disturbing complications that beset the ambitious young surgeon. Despite his enormous experience and his unquestioned ability in the surgical field, he was modest to a fault and preferred the close friendship of his immediate associates to the plaudits of the public. In consequence his appearances before the societies and the number of papers presented by him were strikingly few. His hobby as a collector, while known but to a few, gave him a distinguished rank in this field. His hobby covered firearms and clocks, and of the latter, his collection was one of the most outstanding in the country. His society membership included The Philadelphia County Medical Society, the Medical Society of the State of Pennsylvania, the American Medical Association, the Northern Medical Association of Philadelphia, the American Ophthalmological Society, the College of Physicians of Philadelphia, the American Academy of Ophthalmology and Otolaryngology, the American College of Surgeons. He was also a most enthusiastic member of the Masonic fraternity, being Past Master of the Eastern Star Lodge, Past Eminent Commander Corinthian Commandery, Knights Templar, Philadelphia Consistory, Lulu Temple A.A.O.N.M.S. In politics, he was republican; in religion a member of the German Reformed Church. He was also a member of Pennsylvania Zeta Chapter, Phi Delta Theta fraternity. In February, 1934, he was stricken with an attack of pneumonia to which he succumbed February 17 at his late residence, 1417 N. Broad Street, Philadelphia. He is survived by his wife and one son, and a host of friends by whom he will be greatly missed.

Samuel Horton Brown.

ABSTRACT DEPARTMENT

EDITED BY DR. WILLIAM H. CRISP

Abstracts are classified under the divisions listed below, which broadly correspond to those formerly used in the Ophthalmic Year Book. It must be remembered that any given paper may belong to several divisions of ophthalmology, although here it is only mentioned in one. Not all of the headings will necessarily be found in any one issue of the Journal.

CLASSIFICATION

- | | |
|--|--|
| 1. General methods of diagnosis | 10. Retina and vitreous |
| 2. Therapeutics and operations | 11. Optic nerve and toxic amblyopias |
| 3. Physiologic optics, refraction, and color vision | 12. Visual tracts and centers |
| 4. Ocular movements | 13. Eyeball and orbit |
| 5. Conjunctiva | 14. Eyelids and lacrimal apparatus |
| 6. Cornea and sclera | 15. Tumors |
| 7. Uveal tract, sympathetic disease, and aqueous humor | 16. Injuries |
| 8. Glaucoma and ocular tension | 17. Systemic diseases and parasites |
| 9. Crystalline lens | 18. Hygiene, sociology, education, and history |
| | 19. Anatomy and embryology |

2. THERAPEUTICS AND OPERATIONS

Terson, A. **A new knife of diverse uses.** *Ann. d'Ocul.*, 1934, v. 171, April, pp. 355-357.

Extending from the ophthalmic instrument handle of usual size a slightly curved shank ends in a short stubby blade. The cutting edge of the blade turns sharply to a point at the dull edge. The instrument is recommended for splitting the cornea and for opening the anterior chamber from the outside when the chamber is shallow. It is also an excellent scarifier.

H. Rommel Hildreth.

3. PHYSIOLOGIC OPTICS, REFRACTION, AND COLOR VISION

Barbel, I.-E. **The mosaic pictures of Schaaff.** *Ann. d'Ocul.*, 1934, v. 171, April, pp. 347-353.

This brief report deals with the results in color-blind studies using this method. The author states that the method is as easy as the Ishihara and probably more accurate.

H. Rommel Hildreth.

Berens, C., and McLaughlin, C. K. **The Keeler decagon ophthalmoscope as a refractometer.** *Amer. Jour. Opth.*, 1934, v. 17, May, pp. 402-414.

Cholina and Chernobilskaia. **Minimum daylight illumination for schools.** *Sovietskii Viestnik Opht.*, 1932, v. 1, pt. 11, p. 474.

The authors studied the effect of daylight illumination on the power to sustain visual acuity and on speed of accommodation. The tabulated and charted report shows that work with a thirty-candle-power light reduces both of these functions so that after the fourth hour they are inadequate for the task. With a fifty-candle-power light, which the authors consider the minimum required, the strength of both functions rises until the fourth hour, and only after the fifth hour are they somewhat lower than originally. A hundred-candle-power illumination permits excellence of both functions during an entire working day, and should be the standard school illumination.

Ray K. Daily.

Coblentz, W. W. **Tinted lenses; the present deal.** *Jour. Amer. Med. Assoc.*, 1934, v. 102, April 14, p. 1223.

The author states that, although during the past two years there has been some improvement in the fairness of the claims made in the advertising literature of tinted lenses, there is still a long way to go in presentation of

relevant facts as distinguished from unproved theories. Personal experience indicates that motoring eyestrain is relieved by wearing proper correcting lenses rather than by any of the numerous tinted lenses. "Wide vision" lenses also come in for their just share of criticism.

George H. Stine.

De Petri, M. **Stereoscopic vision without a stereoscope.** *Rassegna Ital. d'Ottal.*, 1933, v. 2, Dec., p. 1348.

Two pictures of an object taken stereoscopically are placed upon a plane at a distance of 60 mm. from each other and one meter in front of the eyes. Holding a pencil in the middle at an equal distance between the pictures, one fixes the pencil and gradually draws it toward the face until one sees a third image which is stereoscopic. The author discusses the underlying principles. (Five figures.)

Eugene M. Blake.

Gassowsky, L. N., and Samsonowa, W. G. **Pulsating variations in the accommodative condition of the eye.** *Graefe's Arch.*, 1934, v. 132, p. 82.

While examining eyes for ametropia with a refractometer, it was noted that the image of a line upon the fundus alternately appeared and disappeared, with a frequency of between three and twenty times a minute. It is concluded that only pulsations in accommodation can explain this finding.

H. D. Lamb.

Guthrie, C. C. **Physiologic lensless spectacles.** *Arch. of Ophth.*, 1934, v. 11, Feb., pp. 254-261.

These studies were based on the fact that light passing through a small hole in an opaque screen can produce sharply defined images on a surface, and that such a hole placed in the focal axis of a lens sharpens the image by reducing aberrations. The author found that by properly graduating the size of the holes and the spacing in a multiple perforated plate or diaphragm placed before an eye, requiring powerful lenses for satisfactory vision, the subject was able to see clearly at all ranges. The

size of the hole varies from 1.5 mm. for far vision to 0.3 mm. for near, and best results were obtained by a spacing of about 4 mm. between holes. (Illustrated.)

J. Hewitt Judd.

Hecht, S., Schlaer, S., and Verrijp, C. D. **Intermittent stimulation by light. The measurement of critical fusion frequency for the human eye.** *Jour. of Gen. Physiology*, 1933, v. 17, Nov. 20, pp. 237, 251, and 269.

A detailed description of the apparatus and methods used in determining the critical frequency of flicker is given. The general form of the relation between critical frequency and intensity is determined by the relative predominance of cones and rods in the retinal area used for the measurements. When measurements are made with the rod-free area of the fovea, the relationship between critical frequency and intensity is given by a single curve which represents the function of the foveal cones. When measurements are made with the retinal area five degrees from the fovea, containing therefore both rods and cones, the relation between critical frequency and intensity shows two clearly separated sections, one for the lower intensities of light and another for the higher intensities which is similar to the one given by the rod-free area alone. These are obviously separate functions of the rods at low intensities and of the cones at high intensities.

Edna M. Reynolds.

Karbowsky, M. **The energetics of color vision.** *Graefe's Arch.*, 1934, v. 132, p. 87.

Color vision includes two basic factors: the physiologic stimulus in the color-sensitive endings of the first neuron of the optic nerve and the psychic process or the reaction of the centers in the brain to the physiologic stimulus. The author found that the energy arrangement of each center was dependent upon the energy arrangement of the peripheral center. The independence of the several centers was based not upon qualitative but upon quantitative modifications of the stimu-

lus. The energy distribution to each center was the result of specific stimuli and of nutritional processes.

H. D. Lamb.

Krimsky, Emanuel. **A simplified lighting-control system for the operation of optical apparatus.** Amer. Jour. Ophth., 1934, v. 17, May, pp. 429-431.

Litinski, G. **Registration of winking as a criterion for the study of ocular fatigue in children following reading.** Sovetskii Viestnik Ophth., 1934, v. 4, pt. 3, p. 275.

The frequency of winking, measured by the Katz-Fink method, can serve as an indicator of ocular fatigue after reading. The method is not sensitive to the variations in fatigue due to various types of print. It may be a suitable method for determining ocular fatigue from various occupations, and for judging the length of the working day.

Ray K. Daily.

Melanowski, W. **The relation of visual efficiency to intensity of illumination.** Klinika Oczna, 1934, v. 12, pt. 1, p. 80.

This is a graphic report of the effect of intensity of illumination on visual acuity, color perception, and visual fields. The equipments used were the luxometers of Kruss-Voege, Osram, and Weston. The charts show that while standard central vision may be obtained with a fifty-candle-power illumination, normal visual fields and color differentiation require a 200-candle-power light. With it central vision may rise to 1.5.

Ray K. Daily.

Pflugk, Albert. **Has the eye anatomical bases for accommodation in the sense of Helmholtz' theory?** Klin. M. f. Augenh., 1934, v. 92, April, p. 445.

The investigations of the last few years have shown that Helmholtz' theory of accommodation has not the necessary anatomical foundations, but it must be assumed that changes of shape of the lens can be explained only by an external force. This can only be the pressure of the vitreous upon the

posterior surface of the lens, based upon a zonula not relaxed but tense.

C. Zimmermann.

Polack, A. **Color vision and its anomalies.** Ann. d'Ocul., 1934, v. 171, April, pp. 289-311.

The author believes that the normal eye distinguishes an unlimited number of colors in the spectrum. He thinks the physiology of the chromatic sense is characterized by position of maximum luminosity (the luminosity curve) and the presence of two unitonal regions, one in the red and the other in the violet. In anomalies of color vision the first of these is modified.

H. Rommel Hildreth.

Rabkin, E. **A new type of protective and corrective spectacles.** Sovetskii Viestnik Ophth., 1932, v. 1, pt. 10, p. 409.

Correcting lenses are made of non-shattering glass.

Ray K. Daily.

4. OCULAR MOVEMENTS

Bonvech, E. **Miner's nystagmus.** Sovetskii Viestnik Ophth., 1932, v. 1, pt. 11, p. 497.

The author considers miner's nystagmus an occupation neurosis, which disappears on rest and tends to recur. Prophylaxis consists not only in sanitary and technical improvements in the mines, but in a careful vocational selection which should eliminate from the mines people with nervous instability. The invention of machines to replace the manual labor in the mines will do away with miner's nystagmus. Working in semidarkness the miners have to depend on paracentral vision which leads to rapid movements of the eyes at work. In people with unstable nervous mechanisms these movements tend to become automatic and independent of the will. The basis of the neurosis is the constant menace of injury by gas explosion.

Ray K. Daily.

Herzau, Werner. **Localization of the subjective vertical in motor disturbances of the eyes, and its diagnostic value.** Graefe's Arch., 1934, v. 132, p. 101.

Measurements for the subjective vertical were made by three methods: (1) in the dark with an illuminated line 30 cm. long at a distance of 50 cm., (2) in the light with Tschermak's apparatus having a white thread on a black disc of 13 cm. radius held at a distance of 50 cm., and (3) with the Hering-Tschermak haploscope. On six emmetropic colleagues, 720 determinations on the subjective vertical for both eyes were made by the first two methods. Observations were also tabulated on 29 cases with paralysis of the superior oblique muscle, 12 of the superior rectus, 4 of the inferior rectus, 5 of the inferior oblique, 13 of all the muscles supplied by the oculomotor nerve, 7 of total ophthalmoplegia, and 7 with paralysis of the abducens; as well as 8 cases of strabismus and 14 with overactivity of the inferior oblique.

H. D. Lamb.

Hughes, W. L. **Prolonged occlusion test.** *Arch. of Ophth.*, 1934, v. 11, Feb., pp. 229-236.

Ten cases are reported to illustrate the value of this test. Three demonstrate Bell's phenomenon or the tendency of the covered eye to turn up. To prevent this the cover is alternated from one eye to the other. The occlusion should be for at least one week and should be continued until the new lenses are obtained. The variations in findings are shown by a series of charts. The test is not to be relied on in all cases, but often indicates measures which will relieve symptoms.

J. Hewitt Judd.

Kramer, V., and Blagoveschenski, M. **The etiology of convergence spasm.** *Sovietskii Viestnik Opht.*, 1934, v. 4, pt. 2, p. 161.

Two cases are reported, one following encephalitis and the other associated with vasomotor disturbance in the labyrinth. While the author does not deny the possibility of a spasm of convergence being functional in origin he believes careful study will discover an organic basis for most cases.

Ray K. Daily.

Ohm, J. **Contribution to nystagmus. Communication 35. The use of the concentric rotating cylinder in diseases of the optic nerve.** *Graefe's Arch.*, 1934, v. 132, p. 42.

When cases of retrobulbar neuritis with a little perception of light in the extreme periphery were tested in the concentric rotating cylinder, the first stage of the optokinetic reaction was a slow associated movement of the eyes without nystagmus. When improvement of the retrobulbar neuritis occurred, this was shown by production of nystagmus of increasing frequency and amplitude, obtained with stripes of gradually diminishing width on the inside of the cylinder. H. D. Lamb.

5. CONJUNCTIVA

Fontana, G. **The sedimentation time of the red blood cells in patients affected by phlyctenular conjunctivitis.** *Boll. d'Ocul.*, 1933, v. 12, June, pp. 598-619.

Of thirty patients whose ages varied from seven to twenty-nine years, affected by phlyctenular conjunctivitis in one or both eyes, fourteen, who were also affected by tuberculosis of the lungs, showed increased velocity of red cell sedimentation. Sixteen, who had prodromal symptoms of tuberculosis, showed moderate velocity of sedimentation; whereas if their general condition improved under treatment the sedimentation time became normal. The writer regards the increased velocity of sedimentation in phlyctenular conjunctivitis as a new proof of the close relation between phlyctenular conjunctivitis and tuberculosis. (Bibliography.)

M. Lombardo.

Gabardi, E. F. **Slitlamp observations of the limbus in spring catarrh.** *Rassegna Ital. d'Ottal.*, 1933, v. 2, Dec., p. 1186.

Gabardi reports biomicroscopic study of conjunctiva and limbus in twelve cases of spring catarrh. In the limbal form he confirmed the previous findings of an irregular new formation of capillaries in the conjunctiva or on the corneal margin, cystic knobs in the spaces

of the conjunctiva near the limbus, and sometimes vacuoles in the corneal parenchyma. Capillary alterations of the limbal network and new-formed capillaries in the cornea occur with a pericapillary cufflike infiltration. The slit-lamp offers aid in the diagnosis of spring catarrh. Eugene M. Blake.

Lijo Pavia, J. **International Association for Combating Trachoma.** Rev. Oto-Neuro-Oft., 1934, v. 9, Jan., p. 12.

Lijo Pavia, J. **Trachoma and blindness.** Rev. Oto-Neuro-Oft., 1934, v. 9, Jan., p. 14.

Lijo Pavia, J., and Dusseldorp, M. **National Institute of Trachoma.** Rev. Oto-Neuro-Oft., 1933, v. 8, Dec., p. 442; and 1934, v. 9, Jan., p. 9.

These three papers contain resolutions presented before the First Argentine National Conference on Social Welfare.

Pascheff, C. **The relapses of true trachoma and the laws of true trachoma.** Arch. di Ottal., 1933, v. 40, Nov.-Dec., pp. 455-465. (Article in French in Italian journal.)

The author proposes to complete and modify his fourth "law of true trachoma" (See American Journal of Ophthalmology, 1934, volume 17, page 372) as follows: True trachoma degenerates and terminates in cicatrization and hyalinization. The degeneration may be produced experimentally by transplantation. Like the lymphocellular hyperplasias of the conjunctiva, true trachoma may also recur, but always with germinating centers of follicles and folliculomas. W. H. Crisp.

Pervoochin, F., and Kalmikov, G. **Roentgen therapy in trachoma.** Soviet-skii Viestnik Opht., 1934, v. 1, pt. 10, p. 444.

Twenty-six patients were given five or six treatments with 30 to 40 percent of the erythema dose, at one to three weeks' interval. The author feels that while roentgenotherapy does not offer a radical cure for trachoma it is valuable. Ray K. Daily.

Schmelzer, H., and Eckstein, E. **Conjunctivitis from Koch-Weeks bacilli.** Graefe's Arch., 1934, v. 132, p. 20.

In a small epidemic of conjunctivitis, where forty-eight cases showed Koch-Weeks bacilli, no constitutional symptoms were observed. In experiments with mice, only four of the thirty-four strains of bacilli produced death and then only by introduction of large doses into the abdominal cavity. With Axenfeld, the authors regard the Koch-Weeks bacillus as variant of the influenza bacillus. H. D. Lamb.

Schmelzer, H., and Eckstein, E. **The significance of the streptococcus and pneumococcus in ocular pathology. (547 observations).** Graefe's Arch., 1934, v. 132, p. 24.

Serpent ulcer of the cornea was caused by pneumococcus in about two-thirds of the worst cases. In seventeen percent of the cases the authors found the organisms to be the streptococcus viridans, also named by some authors the mouth streptococcus. These streptococcic ulcers were not affected by optochin, responded well to simple touching with iodine, and were commonly mild. In the purulent lacrimal sac inflammation, the number of cases in which the exciting organisms were pneumococci and those in which they were streptococci were divided as in regard to serpent ulcer. In the large majority of cases of so-called pneumococcic conjunctivitis streptococci were demonstrated; and pneumococci only in a small number. H. D. Lamb.

Torres y Torres, A. **The pathologic anatomy of vernal conjunctivitis.** Arch. de Oft. Hisp.-Amer., 1934, v. 34, March, p. 126.

The study shows particularly thickening and infiltration of the corium and indicates the essential dermic nature of the affection. Eosinophilia is neither constant nor characteristic. Neither inclusions nor Bellinzona's bacillus have been noted. Among the points of differential diagnostic between vernal conjunctivitis and trachoma is painlessness to touch of the vegetations of the former. M. Davidson.

Weiss, C., and Bowers, G. **Studies on trachoma.** 3. The susceptibility of Rhesus monkeys to conjunctival infection by *Bacterium granulosis* under various experimental conditions. 4. The direct transmission of human trachomatous lesions to various animals. 5. The agglutinability of *Bacterium granulosis* in sera of trachoma patients. Jour. of Immunology, 1933, v. 25, Sept., pp. 227, 247, and 259.

(Paper 3.) By repeated irritation with an alkaline dust (Portland cement) or by previous infection with a virulent hemoglobinophilic bacillus, the monkey's conjunctiva was at times rendered more vulnerable to infection with *Bacterium granulosis*. (Eighty-seven references.)

(Paper 4.) The New World monkey, *Cebus capucinus*, is also susceptible. No evidence of a filterable or inclusion-producing virus was found. (Thirty-one references.)

(Paper 5.) The authors believe there is a more frequent and higher agglutination of *Bacterium granulosis* in trachoma patients. The statement is made that only when an ocular infection is part of a generalized or systemic disease are serum antibodies demonstrable. (Thirty references.)

Ralph W. Danielson.

Wille, W. A. **The local application of antigonococcic serum in gonoblennorrhea and other eye diseases.** Brit. Jour. Ophth., 1934, v. 18, April, p. 218.

The author's experience leads him to regard instillation of antigonococcic serum as a very effective local remedy. The conjunctiva must be cleansed and dried to get the full effect of the remedy, and two or three applications during the day may be made. Two illustrative cases are detailed.

D. F. Harbridge.

6. CORNEA AND SCLERA

Belskii, A. **Comparative evaluation of therapeutic agents in corneal ulcers.** Sovietskii Viestnik Opht., 1934, v. 4, pt. 2, p. 133.

The author discusses prophylaxis including educational campaigns and vo-

cational selection as to eye condition, as well as therapeutic factors.

Ray K. Daily.

Boorsook, G., and Bolgov, P. **The pathology of the cornea infected with typhoid bacillus.** Sovietskii Viestnik Opht., 1932, v. 1, pt. 11, p. 506.

The corneas of rabbits were infected by puncturing with a cataract knife dipped in a mixture of bouillon cultures of three strains of typhoid bacillus. The pathologic process was identical in the twelve infected corneas. It was a triangular opacity, corresponding in shape to the point of the knife, and consisting under the slitlamp of many separate, dense, white dots. There were precipitates on Descemet's membrane, and hypopyon; and finally necrosis of the infected area, and opacification and vascularization of the cornea.

Ray K. Daily.

Casanovas, J. **Blue sclerotics and fragility of bones.** Arch. de Oft. Hisp.-Amer., 1934, v. 34, March, p. 133.

Section of the eyes of a child of nine months, who exhibited blue sclerotics and numerous healed fractures of clavicles, ribs, and upper and lower extremities, showed scleras of only one-half the normal thickness.

M. Davidson.

Filatov, B. **The cornea of the cadaver as transplantation material.** Sovietskii Viestnik Opht., 1934, v. 4, pt. 2, p. 222.

The author argues that improved technique of corneal transplantation will create a demand for transplant material far in excess of that supplied by eyes enucleated from the living. A transplant was taken from the eye of a cadaver forty-one hours after its enucleation. The course was similar to that of living transplants: the tissue remained transparent during forty-one months of observation. Eyes used for this purpose are enucleated two hours after death and kept in a refrigerator at 5 to 6 degrees temperature centigrade.

Ray K. Daily.

Gabrilova, A. **A rare case of ulcer rodens.** Sovietskii Viestnik Opht., 1934, v. 4, pt. 2, p. 286.

A woman of seventy-three years presented herself with bilateral, greyish-white, undermined corneal ulcers, at the limbus in the right eye, and at the center in the left. The unusual features of the case were bilateral involvement, tendency to recur, and hypopyon. Bacteriological investigations revealed a bacillus similar to the Koch-Weeks, the influenza, the xerosis, and the Zur Nedden bacilli, but without their cultural characteristics. It was pathogenic to the cornea of a rabbit and remained virulent in a two weeks culture.

Ray K. Daily.

Goldfeder, F. **Gumma of the sclera.** *Sovietskii Viestnik Ophth.*, 1934, v. 4, pt. 1, p. 76.

Only fifty-two cases were found in the literature. Not one of the thirty cases available for the review by the author was assigned to congenital syphilis. The author's patient presented himself at the clinic because of redness and discomfort in the right eye. The diagnosis was made serologically and confirmed therapeutically. The diagnosis of congenital syphilis by the syphilologist was based on symmetrical indurations of both tibiae and diffuse induration of the right clavicle.

Ray K. Daily.

Grünfeld, Hermann. **Spontaneous prolapse of iris in marginal ectasias of the cornea.** *Klin. M. f. Augenh.*, 1934, v. 92, April, p. 509. (Ill.)

Two cases are attributed to primary degeneration of the cornea due to endocrine disturbance.

C. Zimmermann.

Lapierre, J. **Trepanation of the cornea in serpiginous ulcers.** *Klinika Oczna*, 1934, v. 12, pt. 1, p. 118.

The author is very enthusiastic about this procedure. He used an Elliot trephine, 1.7 mm. in diameter, and trephines above and as far away from the pupil as possible. Ray K. Daily.

Leorber, G., and Kniese, V. **Ultraviolet rays in the treatment of pannus.** *Sovietskii Viestnik Ophth.*, 1934, v. 4, pt. 3, p. 239.

Tabulation of thirty cases treated with general and local ultraviolet irradiation shows a favorable effect on pannus, reinforcing local medication. Blood sedimentation, frequently hastened in patients with pannus, often becomes normal under the influence of phototherapy. Leucocytosis and eosinophilia diminish. The sedimentation reaction is more sensitive to phototherapy than the hemogram.

Ray K. Daily.

Lopez Abadia, L. **Treatment of heredoluetic interstitial keratitis with neosalvarsan.** *Arch. de Oft. Hisp.-Amer.*, 1934, v. 34, March, p. 147.

On the basis of a series of nine cases, the author concludes that the best and most rapid results are obtained from neosalvarsan if the dose is adequate, that is at least 12 mg. per kilo weight; that a total of 5 gm. per series is sufficient; that the manifestation in the fellow eye may be thus prevented; that no complications have been observed; and that heat, milk injections, organotherapy, tonics, and a bandage are useful adjuvants. Bismuth may be used in mild cases.

M. Davidson.

Luftman, A. **A case of a rare congenital corneal opacity.** *Klinika Oczna*, 1934, v. 12, pt. 1, p. 112.

To four cases of bilateral congenital corneal vortex opacity reported in the literature the author adds his own case in a woman of twenty-four years. The opacities consisted of brownish stripes converging to a central point in the superficial corneal layers. The author believes that premature development of the anterior chamber had led to inclusion of a part of the pupillary membrane in the cornea. (Illustrations.)

Ray K. Daily.

Mattos, W. B. **Syphilis of the sclera.** *Arch. of Ophth.*, 1934, v. 11, Feb., pp. 297-299. (See *Amer. Jour. Ophth.*, 1934, v. 17, Jan., p. 79.)

Shapiro-Gochstein, E. **Denig's operation.** *Archiv Oftalmologii*, 1932, v. 8, pt. 9-10, p. 886.

The writer performed the operation thirty-three times for pannus and twice for acid burns of the eyeball, using five to seven sutures to fasten the transplant. In the two cases of corneal necrosis due to acid the results were negative. In pannus the results were satisfactory as to corneal transparency and vision.

Ray K. Daily.

Sharkovskii, I. **Abscess of the sclera.** *Sovietskii Viestnik Opht.*, 1932, v. 1, pt. 10, p. 442.

The case was secondary to prostatitis in a man of eighty-one years. Abscess of the sclera is usually metastatic and its clinical course is that of a severe illness with local and constitutional symptoms. It may be complicated by iritis and choroiditis. The treatment is early surgical intervention.

Ray K. Daily.

7. UVEAL TRACT, SYMPATHETIC DISEASE, AND AQUEOUS HUMOR

Caramazza, F. **Results of injection of aqueous from suspected or experimental tuberculosis into lymphatic glands of the guinea pig.** *Rassegna Ital. d'Ottal.*, 1933, v. 2, Dec., p. 1209.

Caramazza presents a good review of the literature of ocular tuberculosis and relates cases and experiments of his own. He removed the aqueous from presumably tuberculous cases, especially anterior uveitis, and with it inoculated the peritracheal lymph glands of the guinea pig. Tubercle bacilli were never found in these glands but the histologic picture was suggestive of tuberculosis. When aqueous from experimentally infected eyes of rabbits was injected, a true tuberculous adenitis resulted, with the bacilli present. The adenitis appears fairly early and soon extends to other glands of the same region, to glands more remote, and eventually to the spleen.

Eugene M. Blake.

Kaminskaia, Z. **Some facts relative to the innervation of the iris.** *Archiv Oftalmologii*, 1932, v. 8, pt. 9-10, p. 820.

The author studied the reaction of the iris to subconjunctival injections of

adrenalin in rabbits and guinea pigs after severing the cervical sympathetic, and in cadavers one to thirty hours after death. In all cases the pupil dilated; and soon after death the pupillary reaction was as prompt as in the living, becoming delayed with the length of time after death. This demonstrates that the eye, as some other organs, continues to live for some time after death of the body, and that the isolated iris reacts independently of the nervous system.

Ray K. Daily.

Kaminskaia, Z. **The iris as a diagnostic feature of constitutional diseases. A critical review.** *Archiv Oftalmologii*, 1932, v. 8, pt. 9-10, p. 868.

A review of the literature and a suggestion that photomicrographs of living irises be used for identification purposes because, like finger prints, each iris has a distinctive surface.

Ray K. Daily.

Kovarskaia, C. **Sympathetic fundus changes.** *Sovietskii Viestnik Opht.*, 1934, v. 1, pt. 10, p. 436.

A patient of twenty-two years had the left eye injured by a foreign body which penetrated the eyeball posteriorly close to the optic nerve. After unsuccessful attempts to extract the foreign body the eye was enucleated twelve days after the injury. Recovery was uneventful. The patient returned three months later complaining of blurred vision in the remaining eye. Central and peripheral vision were normal, but dark adaptation was delayed. The media were clear and the optic disc normal. The temporal portion of the fundus including the macula was occupied by numerous fine discrete bright dots, without pigment changes. The author considers this a case of sympathetic choroiditis.

Ray K. Daily.

Lagrange, H. **The diagnosis of iridociliary tuberculosis.** *Rev. Oto-Neuro-Oft.*, 1934, v. 9, March, p. 75. (See *Amer. Jour. Ophth.*, 1933, v. 16, Oct., p. 934.)

Lijo Pavia, J., and Dusseldorp, M. **Soemmering's ring and traumatic an-**

iridia. *Rev. Oto-Neuro-Oft.*, 1934, v. 9, Feb., p. 39.

A case is described due to penetrating injury twenty years earlier and exhibiting spontaneous dislocation of the ring into the anterior chamber and its adhesion to the cornea. (Photographs of anterior segment and of slitlamp picture.)
M. Davidson.

Lugli, L. **The retroiridal tunica vasculosa lentis.** *Rassegna Ital. d'Ottal.*, 1933, v. 2, Dec., p. 1334.

Lugli reviews the embryology of the fetal circulation about the lens and reports five cases carefully studied with the slitlamp. Pigment was observed in all the cases in remnants of the anterior, or retroiridal layer. The pigment belongs to the tunica vasculosa because (1) the pigment striae are directly behind the iris, (2) they are constituted of whitish striae and pigment granules which are reciprocally in contact, (3) they have a radial disposition toward the center of the pupil, (4) they are not continued to the equator of the lens, (5) some of the remnants of the pupillary membrane are continuous with the rests of the tunica vasculosa, and (6) the pigment is not of inflammatory origin. (Eight figures.)

Eugene M. Blake.

Zaboogin, K. **Chronic endogenous uveitis simulating sympathetic ophthalmia.** *Sovietskii Viestnik Ophth.*, 1932, v. 1, pt. 10, p. 422.

Four eyes with chronic uveitis were enucleated with the diagnosis of sympathetic ophthalmia. The diagnosis was confirmed microscopically in only one eye.
Ray K. Daily.

8. GLAUCOMA AND OCULAR TENSION

Birich, T. **Juvenile glaucoma.** *Archiv Ophthalmologii*, 1932, v. 8, pt. 9-10, p. 874.

The author gives a review of the literature, a report of six cases, and a plea for a record of careful general examinations and histories, for etiologic study.
Ray K. Daily.

Filatov, B. **In search of new principles insuring fistulation of the an-**

terior chamber in glaucoma. Preliminary communication. *Sovietskii Viestnik Ophth.*, 1934, v. 4, pt. 2, p. 215.

In eyes with corneal leucoma, corneal transplantation cannot be performed until the tension is reduced. Operations for this type of secondary glaucoma are rarely effective, because the fistula of the Elliot or Lagrange operation rapidly fills with connective tissue. The author is investigating the effectiveness of fixing a piece of Descemet's membrane, Bowman's membrane, or lens capsule in the fistula, to line the fistula with epithelium.
Ray K. Daily.

Ivanov, I. **Modification of external sclerectomy in glaucoma.** *Sovietskii Viestnik Ophth.*, 1934, v. 4, pt. 2, p. 155.

The procedure consists in making a conjunctival flap as for an Elliot trephining, outlining the scleral triangle to be excised with a discission knife, cutting through the apex of the triangle with a Graefe knife, and then through the sides with a knife or scissors. Peripheral iridectomy is added. The advantages of this procedure, according to the author, are ease of execution, the possibility of excising the amount of sclera desired, and the elimination of such complications as prolapse of the ciliary body, or falling of the iris before the knife.
Ray K. Daily.

Schulmann, Franz. **Rare accidents after Elliot's trephining, and a contribution to parenchymatous keratitis and trauma.** *Klin. M. f. Augenh.*, 1934, v. 92, April, p. 522.

In the first case recrudescence of congenital luetic parenchymatous keratitis four years after the primary inflammation was attributed to the operative trauma. In the second patient the abnormally low tension and the permanent abolition of the anterior chamber induced anterior synechiae which subsided after regulation of pressure. The third case presented an acute postoperative, probably not infectious, iridocyclitis with very transparent exudation, which soon became vascularized. The complications in the second and third cases were partly ascribed to the fact

that they were not pure cases of chronic glaucoma simplex but transitional to chronic inflammatory glaucoma. In such cases the author advises against Elliot's trephining.

C. Zimmermann.

Terson, A. **Partial lateralization of a first upper antiglaucomatous operation.** *Ann. d'Ocul.*, 1934, v. 171, April, pp. 353-355.

The title nearly serves as an abstract of this paper. Since the first operation for glaucoma may not be successful a second will necessarily be placed disadvantageously when the first lies in the vertical position. The author points out the advantage of making the iridectomy or sclerectomy to the upper nasal side, so that upper temporal approach may be used later if necessary.

H. Rommel Hildreth.

Velhagen, K., Jr. **The use of doryl (carbaminoylecholin) in the treatment of glaucoma.** *Klin. M. f. Augenh.*, 1934, v. 92, April, p. 472.

Velhagen's detailed report of clinical observations concludes that doryl is a powerful miotic, often superior to pilocarpin, and opens a possibility of conservative treatment if eserine and pilocarpin are not applicable. It is available in original bottles of 5 c.c. of a 0.75 percent solution, which may be instilled two or three times a day into both eyes, without danger. As it is a strong poison in the digestive tract, this dose should not be exceeded.

C. Zimmermann.

9. CRYSTALLINE LENS

Abramovicz, I. **The etiology of coronary striae in the crystalline lens.** *Klinika Oczna*, 1933, v. 11, pt. 4, p. 438. (See *Amer. Jour. Ophth.*, 1933, v. 16, Oct., p. 935.)

Ray K. Daily.

Baumgart, B. **Considerations on Vogt's superficial capsular exfoliation.** *Boll. d'Ocul.*, 1933, v. 12, June, pp. 560-597.

Of twelve patients aged between fifty and eighty-one years who showed this exfoliation, seven had pathologic tension and two a tension of 30 mm. of Hg.

The exfoliation was seen at slitlamp examination, the pupil being dilated, when necessary, by subconjunctival injection of adrenalin. Beside the central opaque disc on the capsule and the peripheral granular corona, all the cases showed pigment granules in the anterior chamber. The writer regards the exfoliation and dispersion of pigment in the anterior chamber as important factors in simple glaucoma. The exfoliation is due to the mechanical action of the iris movements. (Bibliography.)

M. Lombardo.

Boehm, Gundo. **The fine structure of the lens capsule.** *Klin. M. f. Augenh.*, 1934, v. 92, April, p. 452.

Boehm states that by means of roentgen optics the fine structure of the capsule of the lens could be further elucidated than was possible with the usual methods.

C. Zimmermann.

Busacca, Archimede. **Considerations on the relationship between lens capsule and vitreous and on the so-called retrolenticular space.** *Folia Clinica et Biologica*, 1934, v. 6, Feb., pp. 19-23.

This is a shorter statement (in Italian) of the matter in the paper by the same author abstracted in the *American Journal of Ophthalmology*, 1933, volume 16, page 1032.

Caramazza, F. **Vogt's superficial capsular exfoliation.** *Rassegna Ital. d'Ottal.*, 1933, v. 2, Dec., p. 1299.

This is a histologic study of four cases in which alterations of the capsule and iris were associated with cataract. There were alterations of the capsular lamellae themselves, some of which showed hyalin degeneration. Analogous massing and fringing of tissue in hyalin degeneration were found upon, and are considered as local alterations of, the pigment epithelium of the iris. The author relates such alterations to vascular lesions of the uvea and holds that frequent association of these with glaucoma and cataract does not presume a relation of cause and effect. (Review of literature; thirteen figures.)

Eugene M. Blake.

Franta, Jiri, and Gosman, Boris. **Polarographic determination of the cystin in the lens.** *Ceskoslovenska Oftalmologie*, 1933, v. 1, no. 1, pp. 39-46.

Important factors in the biochemistry of the lens are certain sulphur compounds (cystin, cystein, glutathion). Some authors show that in the aging lens, and especially in senile cataract, the amount of cystein diminishes. Because by former methods the correct cystein amount of the lens could not be ascertained, the authors employed for this purpose Heyrovsky's polarographic method. This method allows correct quantitative determination of cystein in the lens, from which the amount of cystin can be calculated. (Two molecules of cystein correspond to one molecule of cystin.)

Eight normal pig lenses were examined, then fourteen human cataractous lenses and two nuclear cataracts. In the pig lenses the average amount of cystin was 0.985 percent. In human cataract the following average values were found: complicated cataract, 1 lens, 1.48 percent; nuclear cataract, 2 lenses, 1.325 percent; immature cataract, 1 lens, 1.11 percent; mature cataract with capsule, 8 lenses, 0.968 percent; hypermature cataract with capsule, 2 lenses, 0.945 percent; mature cataract without capsule, 2 lenses, 0.495.

Thus the polarographic method shows the amount of cystin of the lens diminishing with progressive lens cloudiness in senile cataract. In the mature cataract the great part of the cystin was in the lens capsule, for in the mature cataract without capsule the cystin was about one-half of that in the mature cataract with capsule. The amount of cystin in the complicated cataract and the nuclear cataracts was very high.

G. D. Theobald.

Hildreth, H. R. **A surgical ultraviolet lamp as an aid to the removal of dislocated lenses.** *Amer. Jour. Ophth.*, 1934, v. 17, May, pp. 414-416.

Hrankovicova, Lucia. **Cystein reaction of the lens.** *Ceskoslovenska Oftalmologie*, 1933, v. 1, no. 1, pp. 47-51.

The author tested this reaction in eighty-five cataracts and in twenty normal lenses which were extracted four hours post mortem. She came to the conclusion that through maturing of the cataract the amount of cystein diminishes, but that in mature and hypermature cataract this substance does not quite disappear, as Reiss and Jess stated. For normal lenses the amount of cystein seems to be the same in children and adults. In senile cataracts (twenty eight intracapsular and fifty-seven extracapsular) the presence or absence of the capsule did not change the reaction.

G. D. Theobald.

Kugelberg, Ingemar. **Juvenile cataract in dermatoses. Cataracta syndermatotica.** *Klin. M. f. Augenh.*, 1934, v. 92, April, p. 484.

In relation to two cases Kugelberg gives a survey of the incidental literature. Juvenile cataract has been described in so many cases of scleroderma and neurodermatitis that one must assume a connection between them, based upon endocrine disturbances especially of the thyroid and reproductive glands. Thence it may be inferred that cataract may be caused by other endocrine disorders than hypoparathyroidism. The term "cataracta syndermatotica" is suggested.

C. Zimmermann.

Puglisi-Duranti, G. **Experimental cataract from thallium.** *Rassegna Ital. d'Ottal.*, 1933, v. 2, Dec., p. 1158.

The author subjected a series of rats to treatment with acetate of thallium. Lens alterations were found by slit-lamp in all the animals, and in some there was complete opacification. Histologically the lesions were found in the capsular, cortical, and subcortical layers. In the later stages there were always changes in the iris and ciliary body. In spite of dystrophy of the hair, general lesions were not observed. The writer concludes that the genesis of thallium cataract lies in a generalized endocrine dysfunction and that the first changes occur in the glycoregulator apparatus.

Eugene M. Blake

Seegal, B. C., Seegal, D., and Khorazo, D. **Local organ hypersensitiveness. 5. The fate of antigen and the appearance of antibodies during the development of hypersensitiveness in the rabbit eye. 6. An indirect method for its production in the rabbit eye.** Jour. of Immunology, 1933, v. 25, Sept., pp. 207-225.

The conclusions of paper number five in part are: When 0.15 c.c. of undiluted egg white is injected into the anterior chamber of the rabbit's eye traces may be found for as long as eight days. The egg white can never be demonstrated in the serum or in the anterior chamber fluid of the opposite uninjected eye. The injection is followed by appearance of precipitins against egg white in the serum. Precipitins never appear in the anterior chamber fluid before they appear in the serum, and are never found in the anterior chamber fluid of the uninjected opposite eye. When 0.2 c.c. of egg white is injected into rabbits in a single dose subcutaneously, intravenously, or intracutaneously, no precipitins against this antigen appear in the serum. When the same amount of egg white is diluted and injected in four divided doses subcutaneously or intravenously, the serum contains precipitins against egg white to the same titer as that obtained by injecting 0.2 c.c. of the antigen into the anterior chamber of the eye. (Thirteen references.)

The sixth paper presents the following conclusions:

In twelve out of twenty-one rabbits whose right eye was inflamed from introduction of glycerin into the anterior chamber, repeated intravenous injection of egg white resulted in specific local sensitization of the eye to egg white. Control rabbits injected intravenously with egg white alone and other animals whose right eye had been injured with glycerin alone did not develop the eye reaction when the test dose of egg white was injected intravenously. Repeated intravenous injection of egg white in normal animals may produce such general reactivity that later injections of egg white pro-

duce bilateral inflammation of the eyes. (Six references.)

Ralph W. Danielson.

Stahel, William. **Experimental data on erythropsia in aphakic eyes.** Graefe's Arch., 1934, v. 132, p. 1.

In seven aphakic patients who experienced erythropsia after a stay in intensive daylight, the same red vision was observed when all the ultraviolet rays had been excluded from the daylight. The erythropsia shortly after operation for cataract is explained by the previous dark adaptation of the retina and the increased sensitiveness for green thus caused. Experiment showed that principally the visible rays were to blame.

H. D. Lamb.

Wright, R. E. **The operative treatment of cataract.** Irish Jour. of Med. Science, 1933, sixth series, Oct., p. 549; and Nov., p. 599.

A discussion of the procedures adopted as the result of experience with 20,000 cataract extractions at the Government Ophthalmic Hospital at Madras is given. In selecting cases for operation, the trial bandage without culture is used. Having passed a trial bandage test, the conjunctival sac is cleansed with Herbert's perchloride irrigation. O'Brien's akinesia is used routinely, and retrobulbar injection is used in all difficult extractions and in many straightforward cases. Sedatives are used freely, 2 drams of triple bromide, 1/200 hyoscin, 1/4 gr. morphia, 4 tablets of allonal and 2 tablets of medinal being given inside of forty-eight hours if necessary to insure restfulness. The old-fashioned notion that the patient must be kept lying flat and still for days is rejected. Smooth, gentle movement with early sitting up and walking are allowed. The unoperated eye is uncovered within twenty-four hours. In suitable cases the most favored method of dealing with the anterior capsule has been with a needle immediately before the corneal section. Intracapsular extraction is practiced either by the Barraquer technique or

with forceps. "The most disappointing thing about intracapsular extraction is the relative infrequency with which immature cataract can be removed without unjustifiable trauma."

Irrigation of the anterior chamber is considered an important part of the operation of extracapsular extraction. It is carried out rather vigorously until it is considered that no further cortical remnants or capsular tags will come away. A moderately large conjunctival flap without suture, or a bridge flap, is used in most cases. The author recommends completing the section in the limbus or clear cornea. Where sutures are employed, corneoscleral sutures, which effect true surgical closure of the deep wound, are used. No corneal sutures have been found entirely satisfactory. In after cataract, discission with a single Bowman's needle passed through the cornea is practiced. For an emergency of escaping vitreous, a sliding conjunctival flap has been used. Reference is made to the fact that in Madras, where there is a very high percentage of cataract, seventy percent of the population have hookworm. The author believes that senility in itself is not productive of the opaque condition of the lens which we refer to as senile cataract.

Edna M. Reynolds.
Edward Jackson.

10. RETINA AND VITREOUS

Caramazza, F. **Biomicroscopy of the vitreous in retinal detachment.** *Rassegna Ital. d'Ottal.*, 1933, v. 2, Dec., p. 1123.

With the slitlamp the author studied the vitreous alterations in retinal detachment. He reports eighteen cases and reproduces in colored drawings the individual findings. Some cases were studied before and some after surgical intervention, at periods of time varying from twenty-six days to eleven months. All cases were operated upon by diathermocoagulation at the site of rupture. The changes include the presence of small red globules resulting from hemorrhage or blood coagulation, increased visibility of the luminous fascia, increased fluidity of the vitreous mass

with rapid movement of the opacities, increased tortuosity and crossing of the fibers, numerous floating opacities, degeneration of the microfibrillae, and increase in corpuscles.

Eugene M. Blake.

De Petri, M. **Retinitis circinata and retinal thrombosis.** *Rassegna Ital. d'Ottal.*, 1933, v. 2, Dec., p. 1281.

De Petri reports two cases of thrombosis of a branch of the central retinal vein, observed in patients with vascular hypertension. Whitish spots in a circinate form appeared around the macula within a few months, some of the spots becoming confluent. There was marked reduction of the vision and a central scotoma. After a few months there was a gradual clearing of the white spots, which almost disappeared, so that there remained only the macular alterations from the thrombosis. The author considers his cases to be examples of circinate retinitis of hemorrhagic origin. A good review of the literature is presented. (Five figures and six colored drawings.)

Eugene M. Blake:

Derer, Jozef. **Experiences with Guist's operation.** *Ceskoslovenska Oftalmologie*, 1933, v. 1, no. 1, pp. 12-20.

The author describes five cases operated upon by Guist's method. In one case (observed eight months) the retina remained in place and vision was 6/36. Two cases were partially successful; the detachment disappeared but recurred in a few weeks, yet the visual acuity remained better than before operation. Two cases remained unchanged.

G. D. Theobald.

Di Marzio, Q. **Treatment of retinal detachment by thermocauterization and diathermocoagulation.** *Rassegna Ital. d'Ottal.*, 1933, v. 2, Dec., p. 1103.

The author treated twenty-one cases by perforating ignipuncture and nine by diathermocoagulation. Of the former group thirteen were cured, the period of postoperative observation varying from eight months to three

years. Eight cases were improved and four, of inoperable type, were unimproved. Of the cases treated by diathermocoagulation, five were cured and four not. This method is regarded as more efficacious, because some of these cases were of the type generally regarded as inoperable, with multiple rupture, cystoid degeneration, and extensive disinsertion. (Two figures and six colored drawings.)

Eugene M. Blake.

Dykman, A. B. **Angioid streaks of the retina, a report concerning two cases associated with pseudoxanthoma elasticum.** *Arch. of Ophth.*, 1934, v. 11, Feb., pp. 283-291.

The previous reports in the literature are reviewed. The typical ophthalmoscopic picture and the associated skin disease are described. The first case was that of a man of thirty-five years, in whom the streaks were discovered accidentally. Corrected vision was normal. There was some associated choroidal atrophy, but no hemorrhages. The skin lesions were localized at the base of the neck and the right infraclavicular region.

The second case was that of a woman of 55 years, showing typical streaks in both eyes. In the left eye the condition was associated with incipient cataract and retinochoroiditis. The skin lesions were located in the neck, axillae, cubital fossae, and popliteal spaces. The microscopic appearance of the skin is described and illustrated by a photomicrograph. The theories about the histopathological basis for the streaks are reviewed.

J. Hewitt Judd.

Elwyn, Herman. **Nephritic retinitis.** *Arch. of Ophth.*, 1934, v. 11, Feb., pp. 300-320.

Little can be added to Leber's classical description of the retinal findings but considerable change had occurred in the clinician's understanding of nephritis. The typical fundus picture and its variations are described. The underlying pathologic processes are considered as to (1) edema, (2) cotton-wool patches, (3) sharp deep white spots, (4) glistening white deposits and star figure, and (5) arterial changes.

The author's classification of nephritis is presented and those forms in which retinitis occurs are discussed, showing how all the fundus changes are to be explained by constriction of retinal arteries and subsequent chronic under-nutrition of the retina.

J. Hewitt Judd.

Friedenwald, J. S. **Retinal vascular dynamics.** *Amer. Jour. Ophth.*, 1934, v. 17, May, pp. 387-395.

Hagedoorn, A. **Detachment and rupture of the retina.** *Amer. Jour. Ophth.*, 1934, v. 17, May, pp. 400-401.

Jeans, P. C., and Zentmire, Z. **A clinical method for determining moderate degrees of vitamin A deficiency.** *Jour. Amer. Med. Assoc.*, 1934, v. 102, March 24, p. 892.

The electrically illuminated Birch-Hirschfeld photometer was used to determine the sensitivity to light following partial dark adaptation of a group of 213 children. Forty-five of them were found to have subnormal dark adaptation, and approximately a half (twenty-one) were kept under observation and given a good diet, which included cod-liver oil. All who were retained for study regained normal adaptation. The average period required for recovery was twelve days. There are reasons to believe that this test is satisfactory for determining moderate degrees of vitamin A deficiency. (One illustration, one table.)

George H. Stine.

Knobloch, Rudolf. **Contribution to diagnosis of detached retina by means of fluorescein.** *Ceskoslovenska Ophthalmologie*, 1933, v. 1, no. 1, pp. 20-29.

The author injected thirty percent fluorescein solution into the subretinal space of rabbits' eyes. The fluorescein diffused easily and was absorbed in eleven to fifteen days after the injection. With the ophthalmoscope the author could watch the appearance of the fluorescein in the vitreous. The author believes that by this method rupture in idiopathic detachment of the human retina may be diagnosed and localized.

G. D. Theobald.

Peter, L. C. **Treatment of retina detachment by Walker's method of electrocoagulation.** *Arch. of Ophth.*, 1934, v. 11, Feb., pp. 262-267.

This method gave very satisfactory results in eight cases. Two cases are reported in detail. Although the elapsed time is too short to properly evaluate the final results the author favors this method because of its simplicity and accuracy. He advocates local anesthesia, at times preceded by avertin narcosis; free exposure of the sclera, even detaching two muscles if necessary; and placing the needles about 2 mm. apart, so as to include the entire tear. The un-insulated Walker needles permit this interval of separation. (Perimetric charts.)

J. Hewitt Judd.

Poliak, G. **Disturbances in development of the vitreous body.** *Sovietskii Viestnik Opht.*, 1932, v. 1, pt. 10, p. 419.

The author reports the ophthalmoscopic and slitlamp appearance of two cases of persistent canal of Cloquet and hyaloid artery. The presence in one case of a small retinal area different in appearance from the rest of the fundus suggests to the author the possibility of intrauterine choroiditis as cause.

Ray K. Daily.

Scheerer, Richard. **The constitutional origin of certain diseases of the macula lutea.** *Klin. M. f. Augenh.*, 1934, v. 92, April, p. 467.

Scheerer undertakes to show that diseases of the macula, such as senile degeneration and edematous hemorrhagic affections, are not accidental but due to individual constitution, governed by the vascular system. The macula, provided with an especially close capillary network, must suffer if the blood supply sinks below a certain point. Ophthalmoscopically sclerosis of the choroidal vessels, narrow retinal tree vessels with loss of finer branches, displacement of pigment, and retinal cysts (occasionally only visible by red free light), are found. C. Zimmermann.

Slavik, B. **Guist-Lindner operation for detached retina.** *Ceskoslovenska Oftalmologie*, 1933, v. 1, no. 1, pp. 3-11.

Of 22 cases of detached retina thus operated upon in 1932 and 1933, nine cases were cured (1 case only anatomically). Seven had peripheral tears; in two cases no tear was found. Of the 13 unsuccessful cases, 3 had peripheral tears, 4 tears inaccessible to operation, and 6 no tears. The operations were done without selection and without heeding the duration of detachment. Instead of caustic potash pencils, small glass rods dipped into melted caustic were used. For fixation of the eye during the trephining little sharp double hooks were used. Lindner's stenopeic lenses are recommended, before and after operation, and also in cases which are treated expectantly.

G. D. Theobald.

Sobanski, J., and Szczeniowski, J. **The venous pressure of the retina and its relation to intracranial pressure.** *Klinika Oczna*, 1933, v. 11, pt. 4, p. 360.

In seventy-five cases the eyes were cocaineized, the tension taken, the pressure at which a venous pulse appeared determined with an ophthalmodynamometer, and a spinal puncture made. The findings show that venous retinal pressure is closely related to intracranial pressure; that venous retinal pressure, as determined by the appearance of the venous pulse, is a sufficiently accurate indication of intracranial pressure, especially when elevated; and that in every case of raised intracranial pressure, regardless of the presence of choked disc, diastolic arterial pressure was also raised.

Ray K. Daily.

Srinivasan, E. V. **A case of Von Hippel's disease.** *Brit. Jour. Ophth.*, 1934, v. 18, April, p. 221.

A male aged twenty-six years complained of dimness of vision of one week duration. The media were cloudy, the disc normal. One vessel had two aneurismal dilatations, of which one, well out in the periphery, was saccular and placed in a tangle of vessels. From between the two dilatations was a branch extending to the macula, which presented a granular red circle of one-half-disc diameter. The patient gave a history of a blow from a tennis ball

seven years previously, so that the macular condition was likely a sequel of Berlin's edema, and quite independent of the angiomatous condition.

D. F. Harbridge.

Sugg, E. S., and Stetson, D. D. **Pseudoxanthoma elasticum associated with angioid streaks of the retina and diabetes mellitus in sisters.** Jour. Amer. Med. Assoc., 1934, v. 102, April 28, p. 1369.

The lesions in the skin and in the fundi of these two cases were typical. No new light is thrown on etiology, pathology, or therapy. (Five figures, including two photomicrographs of skin sections.)

George H. Stine.

Uyama, Yasuo. **Regional differences of the horizontal cells with particular reference to their extension and arrangement in the retina.** Graefe's Arch., 1934, v. 132, p. 10.

In young cats, the horizontal cells were better developed in the nasal and temporal regions immediately adjacent to the papilla than in the same directions peripherally and in the remaining parts of the fundus. The extent and arrangement of the horizontal cells on the other hand stood in no relation to the tapetum.

H. D. Lamb.

Veil, P., and Felgines. **Obliteration of retinal tears by the galvanocautery.** Arch. d'Opht., 1934, v. 31, March, p. 158.

The Weve diathermo-coagulation operation with ophthalmoscopic control is preferred. Various methods of use of the galvanocautery with the fine point are reviewed, with case reports to show their application to small or large tears, multiple tears, or disinsertions. Patients unsuccessfully operated upon by diathermo-coagulation were later cured by use of the galvanocautery. Diathermo-coagulation is used without hesitancy for it does little damage and, in those cases where it is not effective, secondary operation may be done with the fine pointed galvanocautery. It is advised that the galvanocautery be used first in patients whose retina does not readily go back into

place after bed rest and the wearing of stenopeic glasses. M. F. Weymann.

Vogt, A. **Localization of the indirect ophthalmoscopic image on the outer surface of the sclera.** Klin. M. f. Augenh., 1934, v. 92, April, p. 436. (Ill.)

Vogt describes this method for localization of the gaps in the detached retina.

C. Zimmermann.

Wilbur, D. L., and Eusterman, G. B. **Nutritional night blindness.** Jour. Amer. Med. Assoc., 1934, v. 102, Feb. 3, p. 364.

The authors report a case of highly probable nutritional night blindness following a postoperative gastrointestinal complication in which vitamin A deficiency was prominent. The relationship of this symptom to deficiency of vitamin A and the visual purple are considered. Nutritional deficiency may arise, as in this case, not from inadequate intake of vitamins or other food-stuffs, but from gastrointestinal or other disturbances interfering with either normal digestion and assimilation or metabolic activity.

George H. Stine.

Wostry, Milos. **Etiology of central retinitis.** Ceskoslovenska Oftalmologie, 1933, v. 1, no. 2, pp. 96-103.

In the Brno eye clinic during four years, eighty-three cases of central retinitis were treated and were classified according to etiology as follows: chronic nephritis 3, diabetes 4, traumatic 4, myopia 8, atherosclerosis 13, hypertension 4, lues 4, affections of the paranasal cavities 3, tuberculosis 36, unknown etiology 4.

Central retinitis manifested itself in various ways from simple loss of fine granulation to exudates. In forty-three cases it was unilateral and in forty bilateral. There were forty-nine men and thirty-four women. The best results were obtained in lues, myopia, and hypertension.

G. D. Theobald.

Yores, Arthur. **Melanophore hormone and eye.** Klin. Woch., 1933, v. 12, Oct. 14, pp. 1599-1601.

This hormone plays an important part in the dark adaptation of amphibians. It is also present in hypophysis, mesencephalon, blood, and eyes of mammals. The amount is correlated to the visual faculty of various animal species. Hormone solution instilled into the conjunctival sac of human beings shortens the time of dark adaptation, and the author encourages study of its possible influence upon hemeralopia.

Bertha Klien Moncreiff.

Zamenhof, A. **Surgical treatment of retinal detachment.** *Klinika Oczna*, 1934, v. 12, pt. 1, p. 38.

After critical review of the surgical procedures advocated in retinal detachment, the author describes his own procedure, which consists of localizing the tear, blockading it with a semicircle of nonperforating diathermically coagulated areas 1.5 mm. in diameter and 2 to 3 mm. from each other, and then perforating each coagulated area with the electrocautery.

Ray K. Daily.

11. OPTIC NERVE AND TOXIC AMBLYOPIAS

Kredbova, Pavla. **Manganate treatment of optic nerve atrophy.** *Ceskoslovenska Ophthalmologie*, 1933, v. 1, no. 2, pp. 121-123.

Potassium hypermanganate one percent solution (intramuscular) was used in four cases of optic atrophy and in three cases of pigment degeneration of the retina, according to the Hamburg method. In three cases the optic atrophy first showed a very little improvement, but later progressed. The fourth case remained unchanged during the two months of observation.

G. D. Theobald.

Lijo Pavia, J. **Synchysis scintillans.** *Rev. Oto-Neuro-Oft.*, 1934, v. 9, March, p. 93.

An attempt to register the movements and direction of the opacities by moving pictures and stereoretinography has confirmed a previous observation by the author with the Gullstrand ophthalmoscope, of filaments starting from the fovea and spreading out fan-

like toward the ora. (Illustrated with strips of film to be observed stereoscopically.)

M. Davidson.

Mazal Vladimir. **Etiology of optic neuritis with particular regard to atherosclerosis.** *Ceskoslovenska Ophthalmologie*, 1933, v. 1, no. 1, pp. 32-39.

In eighty-three cases of optic neuritis treated during the last five years in the ophthalmologic clinic in Brno, the etiology was classified as follows: tuberculosis 13, lues 3, disseminated sclerosis 12, affections of accessory nasal cavities 9, autointoxication 12, diabetes 1, influenza 1, neuromyelitis 1, atherosclerosis 7, etiology unknown 26.

Except in cases of toxic neuritis, therapy brought good results. In the seven cases of atherosclerotic neuritis, the intraocular inflammation progressed quickly and permanent deterioration of vision and narrowed visual fields resulted. The course and the ophthalmoscopic picture are in accordance with Uhthoff's classic description. Two cases had a rather benign course, but subsequent attacks might bring further deterioration. Examination showed general atherosclerosis in all seven patients. Prognosis is grave in these cases.

G. D. Theobald.

Michail, D. **Pigmentation of the papilla.** *Arch. d'Opht.*, 1934, v. 51, March, p. 129.

Of four cases the first is described as a plaque of pigment on the left disc discovered in the course of a papilledema caused by a frontal lobe tumor. The second was a linear streak of pigment developed on the right disc eight months after fracture of the right optic canal followed by atrophy of the optic nerve. The third patient had a left congenital zonular cataract, operative aphakia, and partial atrophy of the disc with stippled pigmentation of this atrophic area. The fourth patient had numerous pigmented cutaneous moles, melanosis of the left iris and sclera, pigment on the anterior lens capsule, and serrated pigmentation of the left disc. The literature concerning pigmentation of the disc is thoroughly reviewed, with the statement that only forty-six cases

are reported. The pigmentation may be either congenital or pathological, and may arise from the blood, the choroid, the retina, or the glial tissue. (Drawings of discs and of iris and sclera in fourth case.) M. F. Weymann.

Reimova, Milada. **Treatment of inflammation and atrophy of the optic nerve with sulphur.** *Ceskoslovenska Oftalmologie*, 1933, v. I, no. 2, pp. 116-121.

Optic nerve atrophy and inflammation were treated with sulphur injections (93 percent suspension of sulphur in gelatin) in doses increasing from 0.2 to 2 c. c. The time of observation was six months to two years. Among seven cases of optic atrophy two showed vision and fields improved, in one case the process remained unchanged, and in four the disease progressed though somewhat more slowly. In no case was there deterioration (as described with malaria injections). Of seven cases of retrobulbar or intraocular neuritis two were completely cured and four showed marked improvement. In retrobulbar neuritis, the treatment has the same value as protein therapy, and may be applied for any length of time without danger of anaphylaxis.

G. D. Theobald.

Renedo, M. **Suboccipital air injection and retrobulbar neuritis.** *Arch. de Oft. Hisp.-Amer.*, 1934, v. 34, April, p. 177.

Favorable results are reported from suboccipital air injections in two cases. One patient with optic atrophy of seven years' duration and vision of fingers at two meters in the left eye, recent diminutions of vision to fingers at ten meters in the right eye, and temporal hemiachromatopsia, improved in one month after a series of air injections of 15 to 20 c.c. to vision of 9/10 in the right and 1/5 in the left. Temporal hemiachromatopsia was now demonstrable in the left eye. The cranial fluid was under high tension, while the spinal had been under low tension. Ventriculograms were practically negative. On the basis of a positive tuberculin reaction and of a macular lesion which appeared in the left eye eighteen months after the im-

provement and was diagnosed as tuberculous, a tentative diagnosis of ependymal tuberculous meningitis involving the optic chiasm was made. The second patient with bilateral temporal optic atrophy, and vision of fingers at two to three meters in either eye, improved in six weeks after a series of cisternal punctures to vision of 10/10 in the right eye and 1/10 in the left eye. Tuberculin reaction was weakly positive, and ventriculograms showed blocking of both lateral ventricles. Compression of the jugulars had failed to increase the tension of the flow during one puncture. Good results have been secured in a third case to be published. The method is advocated and further trial suggested.

M. Davidson.

Schloffer, H. **Surgical procedure to relieve pressure upon the intracranial portion of the optic nerve.** *Med. Klin.*, 1934, v. 30, March 29, pp. 421-423.

The main indications for this surgical procedure, which consists in the resection of the roof of the optic canal, are the decline of vision in tower skull and the rare instances of pressure of a sclerotic carotid artery upon the optic nerve, as shown by nasal constriction of the visual fields, central scotoma, and roentgen-ray depiction of calcified carotid walls.

Bertha Klien Moncreiff.

Sheiderof, D. **Association of Leber's atrophy and flat feet.** *Sovietskii Viestnik Opht.*, 1932, v. 1, pt. 10, p. 432.

In a family of five, mother, daughter, and son had Leber's atrophy of the optic nerve and flat feet. The father and another daughter were free from both defects. The transmission is thus not always sex-linked, as maintained by Hippel. The association of flat feet and Leber's disease is attributed by the author to the presence of unrelated genes in one chromosome.

Ray K. Daily.

Simko, S. **Treatment of optic atrophy with atropin.** *Ceskoslovenska Oftalmologie*, 1933, v. 1, no. 2, pp. 112-114.

The author reports his experiences with retrobulbar injection of atropin in

optic atrophy. He treated fourteen cases of various etiology, but in no case did he obtain amelioration. The therapy also had no influence on the progress of the disease. G. D. Theobald.

Sobanski, J. Venous retinal pressure: its relation to intracranial and arterial retinal pressures. Pathogenesis of choked disc. *Klinika Oczna*, 1934, v. 12, pt. 1, p. 146.

From eighty examinations the author establishes a definite relation between the venous and arterial retinal pressures, and between the arterial retinal pressure and general blood pressure. Forty percent of the cases had a constant spontaneous, and four percent an intermittent venous retinal pulse, both synchronous with the pulsation of the carotid. From the tabulated findings of ninety-three cases the writer concludes that venous retinal pressure is in close relation to the intracranial pressure, and that the pressure at which a venous pulse appears is approximately equal to the intracranial pressure. In four cases with trephined skulls, pressure over the openings led to a simultaneous increase in intracranial pressure. The venous retinal pressure was also raised, while the arterial pressure had no such definite relation. Tabulated report of twenty-eight cases with increased intracranial pressure shows that the appearance of choked disc depends on the ratio between the pressure in the retinal arteries and veins. When the ratio of the venous to arterial pressure becomes 1.15 choked disc appears. In each case of increased intracranial pressure the venous and arterial retinal pressure should be determined. Their ratio to each other will point out when a trephine operation is imperative for saving vision. Ray K. Daily.

Stastnik, Emanuel. Concerning gold therapy of optic atrophy. *Ceskoslovenska Ophthalmologie*, 1933, v. 1, no. 2, pp. 114-115.

Gold chloride diluted with twenty percent sodium thiosulphate was used for intravenous injections, 5 mg. minimum and 10 mg. maximum dose being injected every fourth day. The gold

may be alternated with specific injections. Five advanced cases of tabetic optic nerve atrophy were treated, two of postneuritic atrophy, and one of cerebral lues with beginning optic atrophy and abducens paralysis. The results were regarded as promising. During the therapy the urine and the temperature must be watched. This is a preliminary report. G. D. Theobald.

Vasek, Emil. Optic neuritis in Heine-Medin disease. *Ceskoslovenska Ophthalmologie*, 1933, v. I, no. 1, pp. 30-32.

In six cases of Heine-Medin disease which were treated in the year 1932, in the Municipal Hospital of Pilsen, one case of optic neuritis was found, characterized mainly by vascular changes on the disc. Because in this disease eye complications are very rare, it is not clear whether they belong to the picture of the disease. G. D. Theobald.

Wagner, R. The question of tuberculous etiology and experiences with tuberculin therapy in retrobulbar neuritis. *Ceskoslovenska Ophthalmologie*, 1933, v. 1, no. 2, pp. 103-107.

The author suggests the importance of tuberculosis in the etiology of retrobulbar neuritis. In the Olomouc eye clinic thirty-five cases were treated with tuberculin. Some patients had clinical symptoms, others no sign of tuberculosis. The results seemed favorable, but multiple sclerosis appeared to progress as in other cases treated with non-specific therapy. G. D. Theobald.

Walls, G. L. Interpretation of the stripe-formed optic papilla. *Arch. of Ophth.*, 1934, v. 11, Feb., pp. 293-296.

The stripe form of the papilla in the cone-rich diurnal Sciurid retina is found to be adaptive to minimization of the handicap of the blind spot. Studies of all available species show that the length of the stripe is of little consequence, and its width is such that no important objects are eliminated from the visual field in this arboreal and hawk-fearing group in which vertical contours are of the greatest importance. (Photograph.) J. Hewitt Judd.

12. VISUAL TRACTS AND CENTERS

Barr, A. S. **Amblyopia after hemorrhage.** *Amer. Jour. Ophth.*, 1934, v. 17, May, pp. 396-399.

Bodechtel, G. **The changes in the calcarine region in eclampsia and their relation to eclamptic central visual disturbances.** *Graefes Arch.*, 1934, v. 132, p. 34.

When a patient lives for more than twelve hours after onset of eclampsia and death occurs, the visual cortex shows destruction of both the nerve cells and the surrounding glial elements. The cortical gray is then paler at such places, which finally go on to softening. Upon the basis of the histologic changes, the author assumes as the decisive factor such functional circulatory disturbances as angiospasm or stasis. In only two out of nine cases of eclampsia at his disposal, could the author establish changes in the occipital lobe and particularly in the calcarine or visual cortex. In other cases, where the remainder of the cerebral cortex was seriously damaged, the visual cortex was intact. In comparison with other parts of the cortex the calcarine has a particularly good blood supply.

H. D. Lamb.

Charlin, C. C. **Ocular self-mutilation in hysteria.** *Arch. de Oft. Hisp.-Amer.*, 1934, v. 34, March, p. 121.

A case is reported of bilateral profusely secreting ulcers on the lower bulbar conjunctiva, nasally in the right eye and temporally in the left eye, in a woman of twenty years. Hemianesthesia permitting the thrusting of a hypodermic needle through the raised fold of skin on the back of the right hand, under the suggestion that since the right eye was more involved there would be no pain, suggested the diagnosis of hysteria. A binocular bandage for diagnosis was found to have been tampered with. Repetition of the bandage, under constant supervision of nurses, cured the ulcers in a few days. Further study of the case showed a domestic drama resulting from a beloved but delinquent brother having been forbidden the house by the irate father. (Illustrated.)

M. Davidson.

Coleman, C. C., and Hill, E. **Cyst of the optic nerves and chiasm associated with an epithelioma of Rathke's pouch.** *Arch. of Ophth.*, 1934, v. 11, Jan., pp. 42-48.

A girl aged twelve years who over a period of six months had developed frontal headache, progressive loss of vision, and drowsiness, was found to have essential optic atrophy and a dilated third ventricle whose appearance suggested tumor in the region of the optic chiasm. At operation the cystic optic chiasm and right nerve were incised, releasing 4 or 5 c.c. of yellow fluid. Vision improved but death ensued after four months and autopsy revealed an epitheliomatous tumor of Rathke's pouch with cystic dilatation of the preoptic recess which did not communicate with the remaining cavity of the third ventricle, but did invade the chiasm and optic nerves. (Photomicrographs, encephalogram, drawings.)

J. Hewitt Judd.

Ferrari, A. **Chiasmal syndrome from a hypophyseal tumor cured after roentgenotherapy.** *Arch. di Ottal.*, 1933, v. 40, Nov. Dec., p. 493.

A man of thirty-five years showed reduction in vision, pallor of the optic nerve head, especially on the nasal side of the discs, bitemporal hemianopsia for white and color, and preservation of central vision. X-ray examination of the sella showed decalcification. Five irradiation treatments were given to the hypophyseal region, and the patient was observed over a period of three and one-half years. Acromegalic changes did not occur, and there was complete return of the visual function of the right eye and almost complete return of that of the left.

Herman D. Scarney.

Gualdi, V. **The pupillary reaction to convergence in monocular patients.** *Boll. d'Ocul.*, 1933, v. 12, May, pp. 430-446.

The pupillary reaction to convergence in the sound eye of a patient whose other eye became blind or was enucleated persisted for about a year, if simultaneous contraction of the two

internal recti and the impulse to convergence also persisted. In other patients it persisted for unlimited time if they had left-sided monocular vision, which fact speaks in favor of a cortical center for right convergence. The same was true in elderly patients in whom accommodation as a cause of convergence was to be excluded. On these points is based the writer's theory regarding the existence of a cortical center for convergence.

M. Lombardo.

Gurvich, B. **Hysterical amaurosis.** *Sovietskii Viestnik Ophth.*, 1934, v. 4, pt. 2, p. 142.

With a report of several illustrative cases the author maintains that the psychotherapeutic procedure should consist, not in explaining the actual condition to the patient, but in exhaustive and impressive examination followed by more or less disagreeable treatment, the importance of which is impressed upon the patient.

Ray K. Daily.

Vincent, C., and Hartmann, E. **Twelve cases of binasal visual field defects in the course of intracranial affection.** *Ann. d'Ocul.*, 1934, v. 171, March, pp. 193-207.

In the first nine cases the lesion was found at operation. The fields varied from binasal hemianopsia to upper or lower quadrant defects or a preponderant loss of nasal field. Of these cases four showed arachnoiditis at the chiasm. There are three examples of meningioma in the region of the small wing of the sphenoid. A parasagittal meningioma and parietal tumor complete the nine cases. Although the last three cases of the twelve were not verified at operation the cause was probably intracranial, for each showed papilledema. H. Rommel Hildreth.

13. EYEBALL AND ORBIT

Awerbach, M. **Opticociliary resection.** *Sovietskii Viestnik Ophth.*, 1934, v. 4, pt. 2, p. 106.

The author regrets that this substitute for enucleation has fallen into dis-

use, and reports 330 operations. The operation is indicated for painful blind eyes, not menacing life or the vision of the other eye. The pain is practically always relieved, and in most cases the eye remains unaltered in appearance.

Ray K. Daily.

Browder, E. J. **Carbuncle of nose; ophthalmic vein phlebitis; operation for cavernous sinus thrombosis; recovery.** *Report of a case.* *Laryngoscope*, 1933, v. 43, Oct., p. 829.

Such a case is described in a twenty-three-year-old man. The cavernous sinus was occluded by electrocoagulation, access being obtained by a right cranial opening. Orbital swelling lasted six weeks. Final examination showed complete blindness of the right eye, but the extraocular movements were well performed.

Ralph W. Danielson.

Ivanov, C. **A rare case of symmetrical scleral ectasia.** *Sovietskii Viestnik Ophth.*, 1934, v. 4, pt. 3, p. 228.

A twenty-five-year-old woman presented herself complaining of exophthalmos, which had appeared when she was fifteen years of age. Her vision had begun to fail five years previously. The greatest ocular enlargement was slightly back of the insertion of the horizontal recti. The horizontal length of the eyeballs was 35 mm. and of the palpebral fissures 38 mm. Each eye had eighteen diopters of myopia, posterior staphyloma, and slight pigment changes at the macula. X-ray showed vertical stenosis of the orbit due to large antra. The author attributes the myopia to the shape of the orbit. Ray K. Daily.

Lampis, E. **Cholesterinosis in the aniridic eye.** *Boll. d'Ocul.*, 1933, v. 12, June, pp. 547-559.

In a man of twenty years a diverging blind right eye which had had a severe inflammatory process years before showed congenital absence of the iris, a subluxated opaque lens covered by a mass of crystals, and small scintillating bodies in the anterior and vitreous chambers. Chemically and microscopically these appeared to be cholesterol, perhaps originating from the degen-

erate lens and old organized exudate. (One figure, bibliography.)

M. Lombardo.

Sala, G. **Clinical contribution and histopathology of xanthomatosis bulbi.** Boll. d'Ocul., 1933, v. 12, June, pp. 531-546.

An eye operated on for hydrophthalmos, in a girl of seven years, showed yellowish discoloration of the anterior segment; and chemical examination of the ocular tissues showed general adiposis (neural and acid fats, cholesterin, and phosphates), with fatty masses in the anterior chamber and between retina and choroid. The writer regards the prolonged inflammation and circulatory stasis as causes. (Bibliography.)

M. Lombardo.

Tzirlin, B. **Technique of enucleation.** Sovetskii Viestnik Opt., 1933, v. 3, pt. 1, p. 54.

The author finds that bilateral fixation of the eyeball facilitates severing the optic nerve. The tendons of the internal and external recti are grasped and the double hold prevents rotation of the eyeball.

Ray K. Daily.

Verdaguer, J., and Dessauer, H. **Syndrome of the nasociliary nerve.** Klin. M. f. Augenh., 1934, v. 92, April, p. 513. (Ill.) (See abstracts of various papers by Charlin on this subject, Amer. Jour. Ophth., 1931, v. 14, July, p. 705, and later.)

14. EYELIDS AND LACRIMAL APPARATUS

Cameron, Walter. **Bilateral absence of canaliculi.** Amer. Jour. Ophth., 1934, v. 17, May, pp. 432-433.

Camison, A. **A case of pseudo-Graefe.** Rev. Cubana de Oto-Neuro-Oft., 1933, v. 2, Sept.-Oct., p. 235.

The pseudo-Graefe phenomenon appeared in the course of a traumatic third nerve paralysis. Paralysis of the levator is considered a necessary prerequisite for the phenomenon.

M. Davidson.

De Lieto Vollaro, A. **Amyotrophic ptosis of Fuchs.** Arch. di Ottal., 1933, v. 40, Nov.-Dec., p. 466.

In a nineteen-year-old girl, bilateral ptosis was operated on by the author according to Angelucci's technique. During the operation a section of skin and underlying orbicularis muscle was excised from both eyelids. The sections were examined histologically and compared with normal skin and muscle. Poverty of elastic fibers in the deep layers of the dermis and the subcutaneous tissues was found, with progressive atrophy of the fasciculi of the orbicularis muscle. The author concludes that amyotrophic ptosis of Fuchs is an atypical variety of blepharochalasis with accentuation of the ptotic phenomenon as the result of sympathetic nerve disturbance and muscle changes.

Herman D. Scarney.

Gabriélidès, C. A. **Argyrosis of the lacrimal sac.** Ann. d'Ocul., 1934, v. 171, March, pp. 232-237.

One tear sac was removed from a patient with an old trachoma and argyrosis of the conjunctiva. The sac wall was blue-black.

H. Rommel Hildreth.

Johansson, Ernst. **New operation for trichiasis.** Klin. M. f. Augenh., 1934, v. 92, March, p. 388.

After instillation of cocaine and injection of novocaine-suprarenin two percent into the deep layers of the lid, an incision 3 mm. above and parallel to the lid margin is made along the whole length of the lid to the tarsus, which is dissected free from the intermarginal part and 1 or 2 mm. from its posterior covering. A strip of the exposed anterior margin of the tarsus, 2 mm. wide, is excised, and from the upper wound edge a small skin-conjunctiva flap is spread over the tarsus and fixated by four or five sutures. In intense curvature the tarsus may be thinned after exposure of its upper portion.

C. Zimmermann.

Lazarescu, D. **Xeroderma pigmentosum in old patient.** Boll. d'Ocul., 1933, v. 12, June, pp. 517-525.

A woman of seventy years showed a flat neoformation covered by dark crust at the outer angle of the left eyelids, small confluent flat dark formations on the right bulbar conjunctiva nasally, numerous ephelides on the skin of the face and hands, and enlarged preauricular and supraclavicular glands. The main tumor was extirpated and the loss of substance replaced by a pedunculated skin flap from the frontotemporal region. The neoformation appeared to be a spindle-cell epithelioma. Sons and nephews were also affected. (Two figures and bibliography.)

M. Lombardo.

Mata, P. **A modified Gutzeit operation for dacryostenosis.** Arch. de Oft. Hisp.-Amer., 1934, v. 34, March, p. 141.

The Gutzeit operation is practiced exclusively, and gives the author ninety-eight percent of permeable passages. Extirpation is only resorted to as an exception. The author's modification consists in using the burrs first to make the upper and lower openings, and the perforator to connect them, instead of using the latter first and the burrs to extend the opening above and below.

M. Davidson.

Medvedev, H. **Surgery of entropion.** Sovetskii Viestnik Opt., 1933, v. 3, pt. 1, p. 36.

Of the various surgical procedures for correction of entropion the author prefers the operation of Goldfeder, because of its simplicity and uniform effectiveness. An incision the entire length of the lid is made through the conjunctiva and cartilage 2 mm. from the lid border. Into this incision is implanted a piece of auricular cartilage 2 mm. in width and 2.5 cm. long. Sutures are unnecessary. In nine cases under observation for two years there was no recurrence.

Ray K. Daily.

Panico, E. **Intermittent dacryops.** Boll. d'Ocul., 1933, v. 12, June, pp. 524-530.

A woman of thirty-six years showed, when crying, a mass at the outer upper orbital margin, which disappeared slowly in from one to four days during

profuse lacrimation. The mass was hard and tender and, on raising the lid, it appeared as a roundish, lobular, tumor-like formation covered by conjunctiva, between the ball and the lid. The writer thinks that the dacryops was due to partial obstruction of the ducts of the lacrimal gland. (Two figures, extensive bibliography.)

M. Lombardo.

Sevillano, F. **Dacryosolenon, or lacrimal sac intubation.** Arch. de Oft. Hisp.-Amer., 1934, v. 34, April, p. 206.

The sac is exposed as for extirpation, without cutting the internal palpebral ligament, the lower part of the sac is incised, curetted, or cauterized if fungous, a 3 mm. catheter is introduced into the nasal fossa. This is replaced by a permanent 2 mm. canula, wider above and provided with lateral and terminal openings, which is left in situ, and the opening in the sac closed with sutures. The anterior extremity of the inferior turbinate is resected with a punch to keep the nasal end of the canula free and accessible. Irrigation with argyrol is used daily for a week, and the canula is withdrawn through the nose at the end of three months. In case of obstruction, irrigation may be practiced from the nasal terminus as well as through the canaliculus. The canula is well tolerated.

M. Davidson.

Snegirev, K. **Autogenous vaccines in the treatment of ulcerative blepharitis.** Sovetskii Viestnik Opt., 1934, v. 4, pt. 2, p. 208.

The author injected every five to six days 0.2 to 0.5 c.c. of an autogenous vaccine made from the pus of the lids. The treatment led to cure of 32 percent of 210 eyes suffering from prolonged intractable blepharitis, resistant to all previous forms of treatment.

Ray K. Daily.

Stock, W. **The results of the operation for dacryocystoblennorrhea by implantation of the lower end of the tear sac into the nose.** Klin. M. f. Augenh., 1934, v. 92, April, p. 433. (Ill.)

Through the usual incision for extirpation the sac with the periosteum is detached from the nose, the duct cut as

deeply as possible, and with the canaliculi dissected from below upward. The lower end is removed and a thread 10 cm. long inserted on each side. With a trephine of 10 mm. diameter the bone is perforated and from the nose a wire with a loop is carried outward through the hole. The threads are inserted into the loop, are used to draw the sac into the nose, and are secured to the cheek with adhesive. Among forty-five cases thus operated on there were thirty-four cures and six failures. Five cases could not be followed up. As in case of failure it is easy to remove the tear sac, Stock always tries implantation first.

C. Zimmerman.

Velter, E. **Participation of the facial nerve in motor innervation of the lid; the superior facial.** Arch. d'Ophth., 1934, v. 51, Feb., p. 65.

After analysis of research done upon the central pathways of the facial nerve it is concluded that physiologically and clinically the superior facial is relatively autonomic. The sparing of the superior facial in central paralyses is due to bilateral corticonuclear connection through a pathway from the geniculate bundle, and aberrant fibers. In case of a lesion of the pyramidal tract the aberrant fibers suffice for innervation of the muscles of the superior facial, although some weakness may be noticed upon careful study. M. F. Weymann.

15. TUMORS

Awerbach, M. **Hemorrhagic neoplasms of the orbit.** Archiv Ophthalmologii, 1932, v. 8, pt. 9-10, p. 808.

This is a report of two cases operated on with the diagnosis of orbital tumors but in which operation disclosed old hematoma. Subsequent questioning elicited histories of traumatism eight and ten years previously.

Ray K. Daily.

Barkan, H. **Bilateral glioma treated by radium.** Arch. of Ophth., 1934, v. 11, Jan., pp. 20-31.

Radium therapy was first used in this condition by Axenfeld in 1914. A review of the literature reveals only one

case in which a five-year cure was obtained by radiation (Knapp and Ludin). Twelve cases from the literature are abstracted to illustrate the different methods of application. The case of a year-old child with bilateral glioma is reported. The right eye was enucleated. The left eye contained a gray-white mass 5 disc diameters in diameter in the superior temporal quadrant adjacent to the disc. Two applications were made through the sclera at the site of the tumor with two 5-mg. needles in a wax mold inserted through Tenon's capsule, three months apart. This was followed by regression of the tumor, retinal detachment, and blindness. The eye was enucleated about thirteen months after the initial radiation, and histologic examination showed fresh tumor masses. (Illustrations and bibliography.) J. Hewitt Judd.

Knapp, A. **Xanthomatosis of the orbit.** Arch. of Ophth., 1934, v. 11, Jan., pp. 141-147.

This condition is characterized by formation of a tumor below the upper bony margin of the orbit causing proptosis, roentgenologic demonstration of a defect of the frontal bone not connected with the nasal sinuses, certain histologic peculiarities, slow growth, and benignancy. It is cured by operation, with no tendency to recurrence and no effect on the patient's health. The author reports two cases in men, without other symptoms of xanthomatosis except hypercholesteremia. The first patient, aged forty-three years, had an involvement of the left orbit, and the second, aged twenty-eight years, of the right orbit. There was no recurrence after ten months and seventeen years respectively. The growth is not a true neoplasm but is the result of the phagocytic action of the reticulo-endothelial system, which stores an excess of lipoids and produces hyperplastic nodular lesions. It is related to the Schüller-Christian syndrome, which occurs only in young children and involves the ethmoid and the lesser wing of the sphenoid. (Roentgenogram and three photomicrographs.) J. Hewitt Judd.

Poliakov, P. **A rare case of metastatic cancer of the orbit.** *Sovietskii Viestnik Ophth.*, 1932, v. 1, pt. 11, p. 502.

This is a report of a case of flat-cell metastatic epithelioma of the orbit, which developed eight months after excision of the primary growth from a Bartholin gland. Ray K. Daily.

Roy, J. N. **Voluminous orbitocranial osteoma. Consecutive cerebral abscess of nasal origin.** *Brit. Jour. Ophth.*, 1934, v. 18, March, p. 159; also *Ann. d'Ocul.*, 1934, v. 171, April, pp. 339-347.

The patient was a woman aged twenty-four years, who was twice operated upon at an interval of eight years and died of diffuse leptomeningitis. Autopsy findings are given. Originally a radical operation was done for osteoma of the orbit. Recurrence six years later manifested itself in the form of a fibroma in the nose, which underwent ossification, invaded the orbit, and extended into the cranial cavity to give rise to an abscess of the right frontal lobe.

D. F. Harbridge.

Sanyal, Saradindu. **Hemangioma of the conjunctiva.** *Calcutta Med. Jour.*, 1933, v. 28, Oct., p. 172.

Capillary angioma in a patient aged twenty-six years appeared as three small circular tumors, the largest (6 mm. in diameter) being astride the sclerocorneal margin. The tumor had been present from birth but had increased in size rapidly in the last six months. The two smaller tumors (1 mm.) looked like ampulliform dilations of terminal conjunctival arteries. There had been no recurrence for one year after surgical removal.

Edna M. Reynolds.

Stokes, W. H., and Bowers, W. F. **Pure fibroma of the orbit, report of a case and review of the literature.** *Arch. of Ophth.*, 1934, v. 11, Feb., pp. 279-282.

The authors summarize the cases previously reported and point out the rarity of this condition. No cases showing malignant degeneration have been reported. The case reported is that of a man of twenty-five years whose first

symptom was partial ptosis of the left upper lid four years previously. This increased and the globe became proptosed, with later diplopia and pain. An encapsulated mass, attached to the periorbita, behind and lateral to the globe, was found and removed through an incision in the eyebrow. Microscopic examination showed a fibroma composed of a mature type of cell. (Photograph, photomicrograph, and bibliography.) J. Hewitt Judd.

Stroopov, A. **An unusual case of malignant tumor of the temple and orbit.** *Sovietskii Viestnik Ophth.*, 1934, v. 4, pt. 2, p. 210.

After a blow, a girl of seventeen years developed a malignant endothelioma originating from the cranial periosteum and involving much of the right temporal and frontal bones; its largest portion, prismatic in form with the base forward, was between the two thin bony layers of the roof of the orbit. The symptoms were exophthalmos, displacement of the eyeball down and in, and signs of raised intracranial pressure. The first operation was followed by recurrence, and the patient on her own insistence was operated upon again four years later. In spite of the apparently hopeless prognosis the patient was well and there had been no further recurrence six years later. (Photographs.) Ray K. Daily.

Wheeler, J. M. **Schüller-Christian disease (xanthomatosis), report of a case with postmortem observations.** *Arch. of Ophth.*, 1934, v. 11, Jan., pp. 214-224.

The case of a boy aged three years is presented, with description of clinical findings and complete autopsy report, including detailed descriptions of the microscopic findings in the organs involved. There was generalized xanthomatosis of the bones, dura, hypophysis, infundibulum, periosteum, and orbits, together with involvement of the skin and of the thoracic and abdominal organs. (Photograph, roentgenogram, colored illustrations of bone involvement, photomicrograph.)

J. Hewitt Judd.

16. INJURIES

Abdoolae, G. **Traumatism of the orbit with an anilin pencil.** *Sovetskii Viestnik Opht.*, 1932. v. 1, pt., p. 492.

A man of thirty-one years was struck with an anilin pencil, which penetrated into the orbit through the skin of the lower lid close to the lacrimal sac. A fragment of the pencil remaining in the wound produced aseptic necrosis of the orbit. The necrotic area, holding within it the pencil fragment and the solution of the dye, became encapsulated and a chronic abscess discharging intermittently was the result. The dye colored the nasal secretion and saliva, but no colored secretion could be expressed from the lacrimal sac. An attempt to remove the encapsulated abscess was followed by acute inflammatory flare-up with exophthalmos, chemosis, and edema of the lids. Ray K. Daily

Abramovicz, I. **Ocular infection with mushroom spores.** *Klinika Oczna*, 1933, v. 11, pt. 4, p. 440.

The author reports conjunctivitis of fifteen days duration among mushroom workers. Objectively there were edema of the lids, conjunctival hyperemia, and profuse lacrimation: subjectively patients complained of burning and the sensation of a foreign body. With the slitlamp the cornea in the palpebral fissure was seen to be covered with small white oval dots, composed of spores of mushrooms. The spores were also found on glycerin-coated slides exposed in the workroom. They contain a poisonous acid, and the irritative phenomena are due to a mechanical as well as a chemical effect. Ray K. Daily.

Beer, L. **Several cases of foreign body removed from the anterior chamber.** *Klinika Oczna*, 1934, v. 12, pt. 1, p. 128.

Four cases (two cilia, one glass, one copper splinter) yielded satisfactory results. Ray K. Daily.

Cattaneo, D. **Clinical observations and experimental researches on cataract from contusion.** *Ann. di Ottal.*, 1934, v. 62, Feb., p. 81, and March, p. 161.

The changes which occur in the crystalline lens as results of contusion vary according to the nature of the trauma, the intensity and direction of the force, and the local and general conditions of the subject. There is an important medicolegal aspect to be considered. Thirty-nine cases of contusion cataract were studied, in twelve of which the capsule was ruptured, the other fourteen showed capsular changes under the slitlamp, and in eleven no changes could be discovered. The fact that the superficial area is clear while the opacity is deep does not indicate that the original injury was not in the surface of the lens but that the development of the subcapsular layer has overlaid the deeper opacity with transparent substance. Almost always the slitlamp will aid in determining whether the opacity was a result of the blow or had been preexistent.

The author divides the contusion cataracts studied into several groups according to the capsular changes; such as Vossius ring, subcapsular radiations, and rosette and sector cataracts. In several cases of contusion cataract the time at which the injury had occurred could be approximately determined by the clear layers superimposed over a partial stationary opacity. Biomicroscopic examination might therefore be of importance in resolving a difficult medicolegal problem.

From the part of the study relating to contusion cataract produced in the eyes of rabbits, the author arrives at conclusions on the pathogenesis of contusion cataract. (Bibliography, seven plates.) Park Lewis.

Charlin, Carlos. **Secondary ocular affections.** *Ann. d'Ocul.*, 1934, v. 171, March, pp. 223-232.

Seven unusual cases of ocular disease are reported, the cause not being apparent at first but always proved later. In a case of pseudoepithelioma of the cornea the cause proved to be a cilium that rubbed against the part. An extraordinary case was that of a girl of eighteen years, who had suffered for six months with bilateral ulceration of the lower bulbar conjunctiva. With the

eyes sealed behind bandages healing was prompt. The parts were anesthetic, and as the patient wept daily because of a family sorrow the fingers irritated the conjunctiva while the chin rested in the hands. H. Rommel Hildreth.

Damel, C. S. **Traumatic myopia.** Arch. de Oft. de Buenos Aires, 1933, v. 8, Nov., pp. 497-507.

The author reviews cases of traumatic myopia reported in the literature, and analyzes the theories given to explain its pathogenesis. His twenty-one-year-old patient was struck in the right eye with a football. Twenty-four hours after the accident, the eye had marked hypertension and moderate dilatation of the pupil, which did not react to light. Vision was 1/10 and improved to 20/20 with -4.00 sphere. Atropin instillations had no effect on the symptoms. But when discharged sixteen days after the accident the patient had 20/20 vision without correction, tension was normal, and the pupil reacted normally to light. The author believes that this is a case of relaxation of the zonular fibers and not of spasm of the ciliary muscle. (Bibliography.) R. Castroviejo.

Gradle, H. S. **Rupture of the sphincter portion of the iris produced by blunt trauma.** Arch. of Ophth., 1934, v. 11, Jan., pp. 92-101.

After discussing the mechanism of production and the clinical picture of these tears, the author describes three main types: first, those involving the anterior superficial stroma and but little of the sphincter muscle; second, those, best demonstrated by transillumination, involving the sphincter and posterior pigment epithelium, with but little involvement of the anterior stroma; third, those, which may be multiple, involving the anterior stroma, sphincter, and pigment epithelium. These represent increasing degrees of trauma and occur, in frequency, in the ratio of 1 to 3 to 5. Any type may result in an irregularity or immobility of the pupil and be accompanied by weakness of accommodation which may persist for months or even be permanent.

There is no treatment of any value. (Photographs.) J. Hewitt Judd.

Kaminskii, D. **A bilateral burn of the eyes with acetic acid.** Sovetskii Viestnik Ophth., 1933, v. 3, pt. 4, p. 378.

An old man with a bilateral burn of the cornea from acetic acid came to the clinic six days after the injury. He had bilateral traumatic conjunctivitis and keratitis; the cornea was opaque, the iris invisible, and vision reduced to fingers. The conjunctivitis was improving, but the keratitis remained unchanged. Thirteen days after the injury Denig's operation was performed on the right eye; it developed hypopyon and corneal hemorrhages and six weeks after the injury was enucleated. The microphotograph showed absence of the epithelium and Bowman's membrane, and newly-formed blood vessels penetrating the corneal parenchyma. The cornea was infiltrated with leucocytes and epithelioid cells. In the central anterior portion of the cornea were numerous hemorrhages between the corneal lamellae. The anterior chamber contained blood and pus. The choroid and retina showed inflammatory reaction. The left eye recovered with 0.5 vision. Ray K. Daily.

Kanzel, G. **Siderosis of the eyeball.** Sovetskii Viestnik Ophth., 1932, v. 1, pt. 11, p. 482.

The author reports four cases with yellowish staining of the cornea, and a circle of greyish red subcapsular dots in the lens. He emphasizes the importance of the magnet test for a foreign body in perforating injuries, and urges their prompt removal. Records of examination of cases of siderosis in red-free light and with the slitlamp will clarify the pathology. Ray K. Daily.

Marshall, Don. **Intraocular foreign bodies.** Amer. Jour. Ophth., 1934, v. 17, May, pp. 416-421.

Monahan, J. J. **Three hundred consecutive eye injuries.** Pennsylvania Med. Jour., 1933, v. 37, Dec., p. 219.

The type of injuries sustained by 300 coal miners is reviewed. The propor-

tions are about the same as in a larger group of 3,000 cases. Thirty-six percent of the injuries were abrasions and lacerations of the cornea, 22 percent were contusions, 16.6 percent were foreign bodies on the cornea with abrasion, 2 percent were infected corneal ulcers, and 1.3 percent were perforating wounds. Two percent suffered loss of industrial vision. The type of treatment given is outlined and recommendations are made for prevention and early treatment of eye injuries.

Edna M. Reynolds.

Morshovich, A. **Eyelashes in the anterior chamber.** *Archiv Ophthalmologii*, 1932, v. 8, pt. 9-10, p. 889.

While chopping meat a butcher was struck in the eye with a piece of bone. This resulted in a perforating wound of the cornea, prolapse of the iris, and inclusion of two eyelashes in the anterior chamber away from the wound. The prolapsed iris was excised but the eyelashes were left in the anterior chamber because of their inaccessibility and the small size of the wound. The result was uneventful recovery and normal vision. The author joins the group of ophthalmologists who believe that eyelashes in the anterior chamber are not irritating to the eyeball.

Ray K. Daily.

Schnyder, W. F. **Slitlamp microscopy of the eyes of furnace men in rolling mills during and immediately after work.** *Graefe's Arch.*, 1934, v. 131, p. 599.

Such examinations in ten subjects showed immediately after work entirely intact cornea, anterior chamber, and iris; and indications of pathological heating of the eye, particularly of the iris, could not be found. The author accordingly disputes the opinion of Goldman that heat-cataract is due to warming of the lens through heating of the iris.

H. D. Lamb.

Silber, D. **Experimental studies on the influence of great intensity of light upon the rabbit's eye.** *Graefe's Arch.*, 1934, v. 131, p. 586.

In spite of the employment of very great light intensity, as from the open arc-lamp, no pathologic changes in the retina or other part of the exposed rabbit eye could be detected.

H. D. Lamb.

17. SYSTEMIC DISEASES AND PARASITES

Biozzi, G. **Biologic and radiologic researches in ocular tuberculosis.** *Rassegna Ital. d'Ottal.*, 1933, v. 2, Dec., p. 1355.

Biozzi studied seventy-five patients suffering from chronic nonluetic ocular disease and attempted to determine the relationship of tuberculosis to the eye condition, by serum complement fixation, allergic reaction (cutaneous or intradermal), general physical examination, and x-rays of the chest. Fifty of the cases were of anterior uveitis, the others diverse affections. He concludes that the x-ray examination is the most valuable, as sixty-two percent of the cases showed slight but specific evidence of tuberculosis, while sero-diagnosis was positive in only twenty-five percent. A tabulation of the cases is given.

Eugene M. Blake.

Böck, J., and Risak, E. **Periodic oculomotor palsy and tuberculosis.** *Zeit. f. Augenh.*, 1934, v. 83, March, p. 7.

In a woman of thirty years, a history of papulonecrotic tuberculids on the lower extremities was associated with attacks of headache associated with diplopia. It seemed almost certain that the headache was a symptom of meningeal irritation and that of oculomotor palsy was also produced by meningeal tuberculous inflammation, although the presence of a small tubercle near the third nerve could not be ruled out. The favorable effect of specific therapy added weight to this opinion. Probably living tubercle bacilli in the skin lesion caused sufficient immunity to control the intracranial lesion, but when healing was induced in the skin lesion it was again possible for the meningeal inflammation to become active.

F. H. Haessler.

Cantonnet. **Cholesterin's important part in ocular pathology.** Arch. di Ottal., 1933, v. 40, Nov.-Dec., pp. 451-454. (Article in French in Italian journal.)

Very briefly the author mentions the ocular disturbances with which cholesterinemia is associated. They are: retinitis with exudate, hemorrhagic retinitis, gerontoxon, xanthelasma, synchysis scintillans, cataract, glaucoma, corneal edema, ocular palsies, and neuroparalytic keratitis.

W. H. Crisp.

Davis, W. T. **Ocular symptoms of thyroid dysfunction.** Southern Med. and Surg., 1933, v. 95, July, p. 357.

Some of the ocular symptoms of thyroid dysfunction mentioned are lacrimation, asthenopia from convergence insufficiency and disturbances of accommodation, paralysis of extraocular muscles, and the classical signs that go with exophthalmos. Change of glasses and surgical correction of muscle abnormality should not be undertaken too soon after thyroidectomy. Hypothyroidism may also cause marked asthenopia, usually of muscular origin.

Ralph W. Danielson.

Dvorjetz, M. **Ocular complications of grippe and their pathogenesis.** Archiv Ophthalmologii, 1932, v. 8, pt. 9-10, 841.

From an analysis of ocular complications in 1927-1928 and 1930-1931, the author concludes that grippe is a significant factor in the etiology of ocular diseases. The onset of ocular complications may be separated by a long interval from the attack of grippe, and the severity of the grippe has no relation to severity of ocular complications. With the exception of the metastatic uveitis, the prognosis of ocular complications is good. Metastatic uveitis occurs generally in children and terminates in phthisis bulbi. The epidemic of 1927 was characterized by metastatic uveitis, and that of 1930 by diseases of the orbit and sinuses. The Pfeiffer bacillus lowers the resistance of the individual and predisposes to other infections.

Ray K. Daily.

Gouterman, J. I. **Ocular complications in Paget's disease.** (Osteitis de-

formans.) Amer. Jour. Ophth., 1934, v. 17, April, pp. 334-339.

Houdemer, Dodero, and Cornet. **Ocular sparaganosis in Indo-China and the sparganosum.** Ann. d'Ocul., 1934, v. 171, April, pp. 311-338.

This parasite is of the group dibothriocephalidae. The subject is comprehensively dealt with, including the zoology of the animal and the clinical side as seen in human beings. Eleven case reports, illustrations, long bibliography.

H. Rommel Hildreth.

Ianchevsky, N. I. **Ocular complications of grippe.** Sovetskii Viestnik Opht., 1932, v. 1, pt. 11, p. 487.

The author reports twenty-three cases of grippe with the following ocular complications: abscess of the lids, acute conjunctivitis, spastic ectropion, tenonitis, episcleritis, ulcerative central keratitis, plastic iritis, optic neuritis, neuroretinitis, retinal hemorrhages, supraorbital neuralgia, ptosis, and acute inflammatory glaucoma.

Ray K. Daily.

Maslov, P. **A study of rosacea.** Sovetskii Viestnik Opht., 1933, v. 3, pt. 1, p. 42.

13.76 percent of rosaceas of the skin involve the eyes, in the form of blepharitis, conjunctivitis, or keratitis. Whether on the face or eyes, the disease is due to impaired innervation of the bloodvessels, most often traced to endocrine disturbances or intoxications. Sudden change in temperature is a predisposing factor. In treatment of the eye zinc with ichthyol is effective. In deep corneal ulcers curettage of the ulcer, peritomy of the bloodvessels leading to it, and even transplantation of the conjunctiva may be necessary.

Ray K. Daily.

Pitchoolevskii, S. **Rare ocular diseases.** Sovetskii Viestnik Opht., 1933, v. 3, pt. 4, p. 367.

The eyeballs of a forty-year-old woman were completely destroyed by maggots of the flesh-fly (*Wohlfahrtia magnifica*). After cocainization nine-

teen maggots were removed from the remains of the eyeballs. They had buried themselves within the tissues, exposing only their caudal ends containing the posterior respirators. The resulting inflammatory conditions vary from comparatively mild conjunctivitis with good prognosis to involvement of all the tissues of the orbit and loss of the eyes. Another rare disease is vesicular dermatitis of the lid associated with inflammatory symptoms of the conjunctiva, sclera, and iris caused by pederus B. Following a rise of the river Volga, dermatitis of the neck and face caused by this insect is common among shepherds and fishermen. The insect carries in its blood and sexual organs a poison which acts on the connective tissue of the skin. The prognosis is good and the treatment consists in applications of two percent boric acid or five percent resorcin.

Ray K. Daily.

Renard, G. and Halbron, **Concerning the relationship between varicella and zona.** Arch. d'Ophth., 1934, v. 51, March, p. 151.

A six-year-old child was hospitalized for an eye injury two days before hospitalization of an adult affected with a severe ophthalmic zona. Two days later the adult had a generalized eruption with vesicle formation which was diagnosed variously as generalized zona and varicella. Eighteen days later the child was attacked with an eruption on the face and trunk which was diagnosed as varicella. There was no history of exposure of the child before entrance into the hospital. This case is regarded as reinforcing the hypothesis that zona and varicella are manifestations of the same infection.

M. F. Weymann.

Sabata, **A case of migraine with atrophy of the optic nerve, and a second with ophthalmoscopically visible alteration of the central artery of the retina.** Ceskoslovenska Ophthalmologie, 1933, v. 1, no. 2, pp. 107-112.

A woman of 49 years had suffered with ophthalmic migraine since childhood. After an attack of seven days' duration she developed optic atrophy

which the author thinks resulted from the migraine. In a man of twenty-one years, the disc of the left eye was somewhat paler and the vessels narrower soon after a migraine attack. The ophthalmoscopic picture became normal, but the patient noticed a small scotoma.

G. D. Theobald

Sergievski, L. **The nasal nerve syndrome.** Sovetskii Viestnik Ophth., 1934, v. 4, pt. 2, p. 193.

Two case reports illustrate the course of neuritis of the nasociliary nerve, which is characterized by involvement of the anterior segment of the eyeball, anterior rhinitis, and oculo-orbital neuralgia. Nasociliary neuritis may be diagnosed by hypersensitiveness of the three skin areas supplied by the terminal ends of the nasociliary nerve, namely at the upper inner angle of the orbit, the inner angle of the lids, and above the nasal alae. It calls for rhinologic examination and treatment.

Ray K. Daily.

Spiratos, S. **Ophthalmomyiasis. Five personal observations.** Folia Ophth. Orientalia, 1933, v. 1, July-Sept., p. 311.

Five cases of external ophthalmomyiasis caused by the larvae of *Oestrus ovis* are reported. The patient generally feels the contact of the fly with the eye, the eggs being laid (ten to fifteen at a time) during flight. The larvae generally localize in the fornices or inner angle. Complications observed are acute purulent conjunctivitis, blepharitis, dacryocystitis, and iritis. The peasants are reported to use applications of raw liver to the eye; the larvae leaving the eye for the more attractive medium.

Phillips Thygeson.

Vejdovsky, V. **Retrobulbar optic neuritis with subsequent tuberculous retinitis and uveitis.** Ceskoslovenska Ophthalmologie, 1933, v. 1, no. 1, pp. 28-30.

A woman patient, who had retrobulbar neuritis in the right eye, developed nine months later bilateral tuberculous chorioretinitis, most marked on the right side. Later the ciliary body and

iris became involved. The retrobulbar neuritis was tuberculous and was the beginning of the further ocular affections.
G. D. Theobald.

18. HYGIENE, SOCIOLOGY, EDUCATION, AND HISTORY

Adams, A. L. **What is blindness?** Illinois Med. Jour., 1933, v. 64, Aug., p. 143.

The author discusses interpretations of total and economic blindness, and reviews sight-saving provisions in the United States. In Illinois there are usually twelve to fourteen children in each class, and there are forty-four classes in the state. About 4.5 percent of the pupils in such classes in the United States are returned to regular classes in the public schools after from one to two years. (Discussion.)

Ralph W. Danielson.

Alvaro, M. E. **The hospital problem from the ophthalmic point of view.** Rev. Oto-Neuro-Oft., 1934, v. 9, January, p. 21.

The author advocates close affiliation of the eye clinic with the general hospital. Construction and equipment of the eye clinic and hospital section are considered in detail. A social service department is advocated. The directors and superintendent should be medical men for better cooperation with the eye staff.

M. Davidson.

Friedenwald, H. **The first medical refractionist.** Arch. of Ophth., 1934, v. 11, Jan., pp. 67-80.

The history of the development of refraction is traced from the earliest records up to 1870, with particular reference to the part played by the early American physicians.

J. Hewitt Judd.

Ismet, N., and Alexiadès, S. **Fifty years of ophthalmology in Turkey.** Folia Ophth. Orientalia, 1933, v. 1, July-Sept., p. 295.

Ophthalmology was first taught in Turkey at the Military Medical School founded in 1852 and was practiced by military oculists who were also authorized to practice among the civil popula-

tion. Essat Pasha, who began to teach in 1894, was the first to organize a regular course in ophthalmology. In 1909 the Military Medical School was amalgamated with the Civil Medical School to form the present medical faculty. A number of civil ophthalmologists contributed to ophthalmic progress during the period between 1892 and 1922, including Trantas, Gabriélidès, Essat, and Ziya. Since the establishment of the republic the number of hospitals with ophthalmic wards has increased. A vigorous campaign against trachoma was begun in 1926, and a large number of dispensaries are functioning in various parts of the country. Orphanages and many schools are regularly inspected by oculists. The Turkish Ophthalmological Society was organized in 1928. It meets regularly at Istanbul and practically all Turkish ophthalmologists are members.

Phillips Thygeson.

James, R. R. **Woolhouse (1666-1733-4).** Brit. Jour. Ophth., 1934, v. 18, April, p. 193.

This is an exhaustive research of the life and activities of Woolhouse, including his scientific contributions and many of his letters, which were consulted at the British museum.

D. F. Harbridge.

Rollet, J. **Automobile accidents and hemeralopia.** Arch. d'Opht., 1934, v. 51, Feb., p. 73.

Two automobile drivers had each had several accidents after sundown, and each was found afflicted with a definite degree of hemeralopia. It is recommended that all professional drivers have an examination as to light sense, and that private drivers involved in accidents be also tested, with a view to eliminating drivers unfit to handle an automobile under conditions of diminished illumination. M. F. Weymann.

Strathearn, J. C. **The problem of blindness in Palestine.** Part 2. Folia Ophth. Orientalia, 1933, v. 1, July-Sept., p. 278.

The incidence of blindness among the Jewish and Christian populations of

Palestine has been found so small as to be negligible. The incidence among the Moslems, especially in the southern area, is very high. The dirty condition of the houses and of the inmates, in part due to lack of water, contributes to dissemination of disease. Suggested improvements in villages are outlined. A central school for the training of selected village girls in the rudiments of hygiene is proposed. The extension of the ophthalmic clinic scheme is recommended with the formation of subsidiary clinics under male orderlies.

Phillips Thygeson.

Sutcliffe, J. E. **Gardening for the blind.** Outlook for the Blind, 1933, v. 27, Oct., p. 161.

This interesting article delineates the recreational and financial advantages of gardening, and the technique of the various operations. In orienting himself in his garden the author makes use of "sound-marks," having learned the characteristic sounds coming from each direction.

Ralph W. Danielson.

19. ANATOMY AND EMBRYOLOGY

Ernyei, I. **Contribution to knowledge of the nerves of the ocular coats.** Graefe's Arch., 1934, v. 132, p. 140.

The ocular coats of dogs, cats, pigs, sheep, horses, cattle, and rabbits were stained by the silver method of Bielschowsky as well as the prolonged osmium procedure of F. Kiss. No ganglion cells were found. In the choroid and cornea, the nonmedullated nerve fibers predominated. In the sclera, ciliary body, and iris stroma the nerve fibers were mostly medullated. In the ciliary processes, only nonmedullated fibers were observed. The medul-

lated fibers in the cornea extended to the middle of the inner part of the cornea. Beyond this were nonmedullated fibers in the depth of the cornea.

H. D. Lamb.

Fischer, Franz. **Abnormal anlage of the ciliary body in a microphthalmic eye.** Graefe's Arch., 1934, v. 132, p. 71.

From a child with cleft palate, two microphthalmic eyes were removed at autopsy. Nothing of the clinical or general pathologico-anatomic findings were known. The left eyeball presented only the well known changes of microphthalmos. In the right eye, with a sagittal diameter of 5 mm., scleral tissue occurred in place of the cornea; and anterior chamber, iris, pupil, ciliary body, and lens were absent. An extensive coloboma surrounded the entrance of the optic nerve, and at the lateral margin of this coloboma was the anlage of a primitive ciliary body with many vascularized ciliary processes, which in part were well developed.

H. D. Lamb.

Glücksmann, Alfred. **The development of the anterior chamber in man.** Graefe's Arch., 1934, v. 132, p. 51.

The anterior chamber develops, as Lindahl has shown, not by formation of a cleft in the undifferentiated mesoderm, but through the lifting away from each other of two differentiated layers. In succession between the lens and the corneal epithelium there arises first the pupillary membrane as part of the choroid, then the corneal endothelium coming from the sclera, and finally the corneal propria develops from pericocular connective tissue and connective tissue extensions of the external eye muscles.

H. D. Lamb.

NEWS ITEMS

News items should reach the Editor by the twelfth of the month.

Deaths

Dr. Jocelyn Joseph Emmens, Medford, Oregon; aged fifty-three years; died April 3, 1934, of cerebral hemorrhage.

Dr. Max Reynolds Gabrio, Philadelphia, Pa.; aged forty-nine years; died April 26, 1934, of heart disease.

Dr. John Forest Dickson, Berkeley, Calif.; aged seventy-eight years; died April 3, 1934. Dr. Dickson was emeritus professor of ophthalmology, University of Oregon Medical School.

Dr. Julian Hiland Dewey, Philadelphia, Pa.; aged sixty-six years; died March 30, 1934.

Dr. W. C. Finnoff, Denver, Colo.; aged forty-four years; died June 10, 1934 of heart disease.

Miscellaneous

The Third St. Louis Educational Week for the Blind, sponsored by the Missouri Commission for the Blind, was held May 7-12, 1934. Fourteen civic organizations cooperated in the demonstrations.

On June 4, 1934, Mrs. Winifred Hathaway, Associate Director of the National Society for the Prevention of Blindness addressed the Alabama Conference of Social Work on "Eye Protection for the Physically Handicapped."

Societies

The Washington Ophthalmological Society was organized in May. Ophthalmologists

from Maryland, Virginia, West Virginia and North Carolina were invited to join the society. The officers are Dr. William Thornwall Davis, Chairman; Dr. Le Roy Hyde, Vice-Chairman; Dr. James N. Greear, Secretary-Treasurer.

The Minnesota Academy of Ophthalmology and Otolaryngology elected the following officers for the ensuing year: Dr. James S. Reynolds, President; Dr. Henry Grant, 1st Vice-president; Dr. Frank Knapp, 2nd Vice-president; Dr. Walter E. Camp, Secretary-Treasurer.

The North Dakota Academy of Ophthalmology and Otolaryngology elected the following officers for the ensuing year: Dr. W. R. Winn, President; and Dr. F. L. Wicks, Secretary.

Personals

Dr. William H. Wilmer retired July 1, 1934, as Professor of Ophthalmology of the Johns Hopkins Medical School and Director of the Wilmer Institute.

Dr. Alan C. Woods of Baltimore, was appointed Acting Professor of Ophthalmology and Acting Director of the Wilmer Institute.

Dr. Arthur J. Bedell of Albany, New York, was elected President of the Medical Society of the State of New York for the ensuing year.